FLOOR DISTRIBUTION OF STANDARD AUTOMATIC SPRINKLER HEADS

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FLOOR DISTRIBUTION OF STANDARD AUTOMATIC SPRINKLER HEADS

A THESIS

PRESENTED BY

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Dean of Engineering Studies

Dean of Cultural Studies

P R E F A C E.

The object of this investigation was to study the floor distribution of standard automatic sprinklers. The work was of a similar nature to that performed in the past two years by Senior students in the Fire Protection Engineering course of Armour Institute of Technology. This investigation will probably be continued with the ultimate object, by means of sufficiently thorough and exhaustive tests, and by the curves drawn and data compiled, of drawing up standard specifications for the "Floor Distribution of Standard Automatic Sprinklers" for Underwriters' Laboratories.

The authors wish to take this opportunity of expressing their sincerest thanks to Mr. H. H. Allport, Assistant Professor of Fire Protection Engineering at Armour Institute of Technology, and to Mr. J. E. Evans, of

the Sprinkler Department of Underwriters' Laboratories, for their cooperation in this investigation.

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INTRODUCTORY.

The investigation of the Floor Distribution of Standard Automatic Sprinklers was carried on in two distinct sections, namely, Discharge and Distribution and will be discussed under three heads.

Part 1. Discharge

Part 2. Distribution

Part 3. Conclusions.

A brief outline of the object of each section will be given here, while a detailed account of the methods of test will be treated separately.

The object of Part 1 is to secure a curve, by means of which, knowing the pressure in pounds per square inch on an automatic sprinkler head in operation, the discharge in gallons per minute may be directly read.

The object of Part 2 is (a) to secure a "zone distribution" curve, showing the distribution over each "zone" in gallons per square foot per minute and (b) to secure a "sector

distribution" curve showing the distribution over each "sector" in per cent of the theoretical amount of water in each sector.

The object of Part 3 is to draw conclusions, by means of the curves secured in Part 2, as to the pressure and distance of head from ceiling that will give the most satisfactory floor distribution.

Later on, when a sufficient number of heads have been tested, general conclusions can be drawn and specifications drawn up, as to what shall constitute a satisfactory floor distribution.

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Part I

DISCHARGE.

a) Apparatus --

The apparatus used consisted of the following:

A cylindrical tank of four feet diameter with a capacity of two hundred and fifty gallons. The contents of the tank was read by means of an ordinary gauge glass, calibrated to read to tenths of a gallon. The tank could be emptied by means of a quick opening outlet valve at the bottom.

The sprinkler head to be tested was installed in the piping as shown in Fig.1, with the addition of a length of pipe three feet long, fastened to the swivel pipe, so that the whole arrangement could be swung around from one position to another. At the end of this length of pipe, the piezometer connection was made and from this connection, a rubber patrol hose lead to the two gauges, one reading from zero to fifty pounds and the other reading from zero to two hundred pounds, and used respectively for pressures from zero to twenty-five pounds and from twenty-five

pounds up. (See Fig. 1)

The pressure was regulated by means of a valve, operated by a long stem and a hand wheel. The water supply was received from a Quimby Fire Pump, pumped over to a forty-five hundred gallon vertical pressure tank.

The flexibility of pressure desired was secured by means of an air cushion in the pressure tank, the supply of air being received from an air compressor.

The heads used were 165 degree heads of the following makes:

The Esty, the Niagara and the Manufacturerers.

b) - Test Method .

The head was installed in the piping and the tank placed in position so that the head was directly over the center of the tank. On the end of the pipe, placed over the sprinkler head was an inverted galvanized iron cylindrical hood, to direct all the discharged water into the tank. The tank was made perfectly level, so that there would be no errors in the reading of the gauge glass.

The pipe was then swung away from the tank by means of a large pole, to a sufficient distance to prevent water splashing over into the tank when the pressure was turned on.

The pressure was then adjusted to a definite value, by means of the long stemmed valve, after the zero point of the gauge glass had been read, and, at a given signal, the head was swung back over the center of the tank. A five or seven minute run was made, during which time the pressure was kept constant. At the expiration of the time the head was swung away from the tank and the pressure turned off. After the surging in the tank had subsided, the gauge glass reading was taken.

Pressures were taken at five pound intervals from sixty pounds per square inch down to ten pounds per square inch and from there down to three pounds per square inch at one pound intervals.

DISCUSSIONS AND RESULTS.

From the data obtained, pressure discharge curves were plotted. The pressure in pounds per square inch was plotted as abcissae and the discharge in gallons per minute was plotted as ordinates. From the resulting curves, it is possible to find the discharge if the pressure is known, and vice versa, for each head.

By studying the general shape of the curves it is seen that they resemble each other to some extent and theoretically they should, because, if the formula, which shows that the velocity is caused by a certain static head, is analysed, it is seen that the equation is of the second degree and therefore when plotted on coordinate paper, the resulting curve is a parabola. For this reason all the pressure-discharge curves resemble parabolas.

If an equation of the second degree is plotted on logarithm paper a straight line will be obtained. If the data obtained in these tests are plotted on logarithm paper a straight line will be obtained for one part of the test and another straight line for the second part of the test. These lines will intersect, if extended. This fact indicates then, that the pressure discharge curve is really made up of two parabolas. These two parabolas have slightly different slopes because the constant in the equation changes slightly in the latter part of the test.

If a detailed study of the pressure-discharge curve is made, it is seen that for pressures up to about 40# per square inch, the Manufacturers head has the greatest discharge, the Esty and Niagara heads having a lower and almost identical discharge. As the pressures go above 40# per square inch the discharges from each head are almost equal.

The pressure reading taken on the gauge was not the total pressure causing the discharge of the water, but represented the sum of the static and potential heads. According to Bernoullis Theorem, however, in cases of steady flow, the pressure causing that flow is made up of three factors; viz: velocity-head, potential-head, and static-head. The sum of these three heads at any section of a pipe is a constant quantity, being equal to the sum of the corresponding heads at any other section.

Therefore to obtain the total effective pressure the velocity-head must be computed and added to the gauge reading. This velocity-factor correction is calculated from the formula:

$$Pv = K' q^2$$

This is worked out on page 10 and a table of the velocity-correction curve points is included. From these points a velocity-factor curve was drawn and correction was then added to the pressure-discharge curves for each head and the resulting curves drawn. These resulting curves now show

the effective or total pressure, causing the discharge from the sprinkler head.

The Esty and Niagara head curves are found to be smooth, while the Manufacturers head curve has a break occuring at about 40# per square inch pressure. By studing Fig 3, which shows the cross-section of the three heads, it is seen that the Manufacturers head has a much longer shoulder than the other two heads. By the shoulder is meant that part of the head from the top of the orifice to the place where the slight enlargement of the inside diameter occurs. The orifice in all three heads is exactly one half of an inch. Therefore the ratio of the length of the shoulder to the diameter of the orifice is largest in the case of the Manufacturers head and very much smaller in the case of the other two heads. Some experiments have been conducted on similar cases and it was found that if the ratio of the shoulder to the orifice was larger the break would occur at a higher pressure, and if the ratio was decreased, the break would occur at a lower pressure.

This then explains why there is a break in the Manufacturers head curve and apparently none in the case of the other two heads. The results of the above named experiment would seem to indicate that a break ought to occur in all cases where there is a shoulder. Undoubtedly, this is so, but the pressures employed in this test for the low discharges were at one pound intervals until a ten pound pressure was reached, and then discharges at five pound pressure intervals were run. If the break in the Esty and Niagara discharge curves occurs at some low pressure below one pound, it was not detected, nor was it attempted to do so, as it wasn't practical or necessary for the purpose of this experimentation.

SAMPLE CALCULATION

PART 1

Discharge

Total Gallons	89
Length of run	2 min.
gal. / min.	44.5

Velocity Factor Correction.

$h = \frac{v^2}{2g}$; $v = \frac{q}{a}$; $a = .7854\ d^2$

$$h = \frac{q^2}{(.7854)^2 \times 64.32 \times d^4} = \text{feet of water}$$

Changing to pressure in pounds / sq. in the resulting equation is :

$$Pv = \frac{(.1337)^2 \times 12^4 \times .434}{(.7854)^2 \times 64.32 \times 60^2} \times \frac{q^2}{d^4} = K\frac{q^2}{d^4}$$

Solving: $K = .00112625$

.. $Pv = .00112625 \times \frac{q^2}{d^4}$

Where, Pv= pressure correction in lb. / sq. in.

q = discharge in gallons / min.

d = diameter of piezometer

Since, d in this case is 0.755 inch.

$$K' = \frac{.00112625}{(.755)^4} = .00346623$$

Using the new constant,

$$Pv = .00346623 \times q^2$$

Vel. Factor Correction applied to curve;

Gallons / min = 44.5

Gauge pressure = 60 lbs / sq.in.

Vel. Factor Correction = 6.85# / sq.in.

(from curve)

Effective Pressure = 66.85# / sq.in.

P A R T 2.

Gauge pressure = 5# / sq. in

Velocity Factor Correction = 1.00# / sq.in.

(from curve)

Effective Pressure = 6# / sq.in.

Total discharge (from curve) = 14.75 gals / min.

Theoretical Q / sector = $\frac{14.75}{8}$ = 1.843 gal / min.

Weight in pan #1 = 13.5 pounds

Net weight of water = 13.5 - 13 = 0.5 #

Total wt. of water in pan #1

(8 positions) = 13 pounds.

Total water in zone A (6-7-1/2)=

sums of pans, 1, 2, 3, 4)

(8 positions) = 50.25 pounds

Gallons in Zone A-(6-7-1/2)= 50.25 ÷ 8.33 =
6.03 gals.

Gallons / sq.ft / Min. in Zone

$$A-(6-7-1/2 = \frac{6.03}{63.61 \times 5} = .019 \text{ gal.}$$

(area of zone 63.61 sq.ft.) (run 5 min.)

Per Cent in zone A-(6-7-1/2 $= \frac{6.03 \times 100}{14.75 \times 5} = 8.18\ \%$

Total pounds in Sector 1 = Sum of pans

1-12 = 36.45

Total gallons in Sector 1 = 36.45 ÷ 8.33 = 4.37.

Per Cent in Sector 1 $= \frac{4.37 \times 100}{1.843 \times 5} = 47.4\ \%$

(Theoretical Q = 1.843 gal / min.)

PART 2.

D I S T R I B U T I O N.

a) Apparatus.

The apparatus used for this part of the investigation consists of that shown in Fig. 1. A wooden ceiling, 8' x 8', was attached as shown, with the vertical pipe entering 2' from center and a horizontal pipe of such length as to have the sprinkler head directly under the center of the ceiling. The pressure gauges were arranged as in the illustration.

Directly under the center of the ceiling, on the floor, is an iron base swivel which supports an iron carriage, in the form of a 45^0 sector, of 7-1/2 foot radius. Therefore, to make a complete revolution about the center point, eight consecutive positions must be taken. A definite sector was taken as No. 1 and the eight sectors were numbered consecutively in a clock-wise direction.

On the sector carriage were placed twelve pans, constructed in such a manner that they covered the entire area of the sector, and would catch all the water over that area. (See Fig. 2)

A cover of galvanized iron was arranged as in illustration, so that it could cover all the pans when this was desired. (For further details of sector constructions see Rietz & Pfaflins thesis on 'Design of Apparatus for Floor Distribution').

As mentioned above, the sector pans were twelve in number and were numbered for convenience, with No. 1 at left hand of the extremity of sector. No. 2 would be next pan on the left of No. 1. The apex pan would therefore be No. 12.

The twelve pans comprise the sector, while the "zones" are comprised as follows:

Pan No.	Zone	Area Zone in sq.ft.	Distance in ft. from center
1, 2, 3, 4	A	63.61	6 to 7-1/2
5, 6	B	34.56	5 to 6
7, 8	C	28.27	4 to 5

Pan No.	Zone	Area Zone in Sq. ft.	Distance in ft. from center.
9) 10)	D	21.99	3 to 4
11)	E	15.70	2 to 3
12)	F	12.56	0 to 2

A complete 'zone' consists of the eight sector positions.

b) TEST METHOD

The test was carried on in the following manner, the heads being taken in the following order: The Esty, the Niagara and the Manufacturers, running complete tests on one before taking another.

The sector carriage was set in postion 1 and the cover rolled over the pans. The distance of the deflector from the ceiling was then adjusted to 3", by means of a rachet connection and the head placed under center of the ceiling. The pressure was then turned on and adjusted to 5# / sq. in. true pressure and when constant, the cover was removed and the pans exposed. For 5# / sq. in. pressure the run was of 7 minutes duration

while for other pressures it was of 5 minutes duration. At the end of the period, the cover was pulled back over the pans and the water turned off. A run constituted the time from which the sector was just uncovered to the time when it was just being covered, the covering and uncovering being done in the same direction and at the same velocity. When the dripping from the ceiling had ceased the cover was removed and each pan weighed separately and the data recorded.

The tare weight of the pans were as follows:

No.	Wt. in Lbs.	No.	Wt. in Lbs.
1	13.00	7	12.50
2	12.75	8	12.80
3	12.75	9	10.60
4	12.75	10	11.25
5	14.4	11	14.00
6	14.75	12	13.50

Runs were next made at 25# / sq. in. and then at 50# / sq. in. pressure.

The head was then adjusted to 6" from the ceiling and pressures of 5#, 25# and 50# / sq. in. taken as above.

The process was then repeated with the deflector 10" from ceiling.

This completed the investigation for the Esty head.

The same test runs were then made with the Niagara and Manufacturers heads.

From this data, calculations were made as in accompanying sample. Calculations and the "zone distribution" and "sector distribution" curves were plotted.

In plotting the former, the zone in distance from center in feet was used as the abscissa and the gallons per sq. ft. per minute as ordinate, for each pressure and each position from the ceiling.

In plotting sector distribution curves, the following method was employed. Instead of using rectangular coordinates, concentric circles were employed to represent percentages. The circles were divided into the eight equal sectors. On these sector lines, the

percentage of the actual discharge to the theoretical was laid off. By connecting these points, the sector distribution of the head at that particular pressure and distance from the ceiling was shown.

c) Discussion and Results.

Upon examination of the zone distribution curves the following facts are evident:

For the 5# per square inch observed pressures and different positions of deflector from ceiling, most of the water is distributed over zones F and E. The remaining zones receive a very much smaller though relatively uniform distribution.

For the 25# per square inch observed pressures and different positions of deflector from ceiling, the distribution is greatest and somewhat uniform in zones F, E and D. In the remaining zones the distribution decreases as the distances from the center increase.

For the 50# per square inch observed pressure and different positions of deflector from ceiling, the distribution is more uniform throughout all zones than in the previous two pressures.

The amount of water thrown outside the pans is lowest for the 3 inch position of the deflector from the ceiling and increases as the distance from the ceiling is increased.

Upon examination of the sector distribution curves the following facts are evident:

For the 5# per square inch observed pressure and different positions of the deflector from the ceiling, the sector distribution was relatively uniform, averaging about 80%.

For the 25# per square inch observed pressure and various positions of deflector from ceiling, the sector distribution is less uniform, averaging about 90%.

For the 50# per square inch observed pressure and various positions of the deflector from the ceiling the sector distribution is quite varied.

P A R T

-3-

C O N C L U S I O N S.

A zone distribution curve that approaches a straight line and has the greatest percentage of water within the zones, is the ideal curve. When a zone distribution curve approaches a straight line it demonstrates that the distribution per unit area is equal throughout the entire floor space.

A sector distribution curve is best when the curve is a regular octagon with its points on the 100% circle. A curve of this nature shows that an equal amount of water was discharged into each sector and the percentage less than 100 is the quantity which fell outside of the pans.

The following heads are considered to have the best zone and sector distribution curves, under the conditions mentioned:

3 inch position and 5# pressure

Zone Distribution - Manufacturers.

Sector " - Esty.

3 inch position and 25# pressure.

Zone distribution - Niagara

Sector " - Manufacturers.

3 inch position and 50# pressure.

Zone distribution - Esty

Sector " - Niagara.

6" position and 5# pressure.

Zone distribution - Manufacturers

Sector " - "

6" position and 25# pressure

Zone distribution - Niagara

Sector " - Manufacturers

6" position and 50# pressure

Zone distribution - Esty

Sector " - "

10" position and 5# pressure

Zone distribution - Manufacturers

Sector " - Esty

10" position and 25# pressure

Zone distribution - Niagara

Sector " - Manufacturers.

10" position and 50# pressure.

Zone distribution - Niagara

Sector " - "

The results obtained may be checked only when all the conditions of the original test are duplicated in the check run. The following are some of the conditions which may be easily overlooked and yet which have a definite bearing on the results obtained:

1.) Position of the pipe holding the test head and through which water was supplied to the head.

2.) Position of the arms of the test head with respect to the pipe mentioned in (1).

3.) Location of sectors.

4) Service Pressure.

The above conditions will be more clearly understood when each of the above conditions is considered as applying to each head separately:

1) The pipe holding the test head was pointing east and West coming through the ceiling

in the western half and terminating under the center of the ceiling. This condition was constant for all three heads tested.

2) In testing the Esty head, the head was screwed in tight, with the arms perpendicular to a vertical plane through the supply pipe.

The Niagara head was tested with its arms in the same vertical plane of the supply pipe.

The Manufacturers head was tested with its arms making a 60^0 angle, in a counter clock-wise direction, with the vertical plane of the supply pipe.

3) This vertical plane of the supply pipe was the division line between sectors 1 and 8. Sector 1 was therefore under the eastern half of the stand and south of the vertical plane of the supply pipe. The sectors were then numbered consecutively in a clock-wise direction.

4.) Such tank pressures were used as would give the most steady flow for the required discharge pressure. When the heads were run at 50# per square inch discharge pressure, the service pressure was kept at about 100# / sq.in. For the 25# discharge pressure, the test was made with the service pressure at about 80#. For the 5# discharge pressure, the run was made at about 60# service pressure. These were the same for all the heads. The above named service pressures gave a steady discharge without much variation in the discharge pressure, thereby making it easy to hold a constant discharge pressure during the length of run.

If the above named conditions are not duplicated in checking the results, the following differences in results will be obtained.

A change in condition (1) or (2) will make a difference in the amount of water in each sector, although the total amount in all eight sectors would remain the same. These results would give different sector and zone distribution curves for the heads. A change in condition (3) would not affect the zone distribution curve but the relative position of the sector distribution curve would be changed. A change in condition (4)

would make it difficult to keep the discharge pressure uniform and, therefore, would change the amount of total discharges. The general appearances of the curves would be very little affected.

Fig.1.
General View of Apparatus.

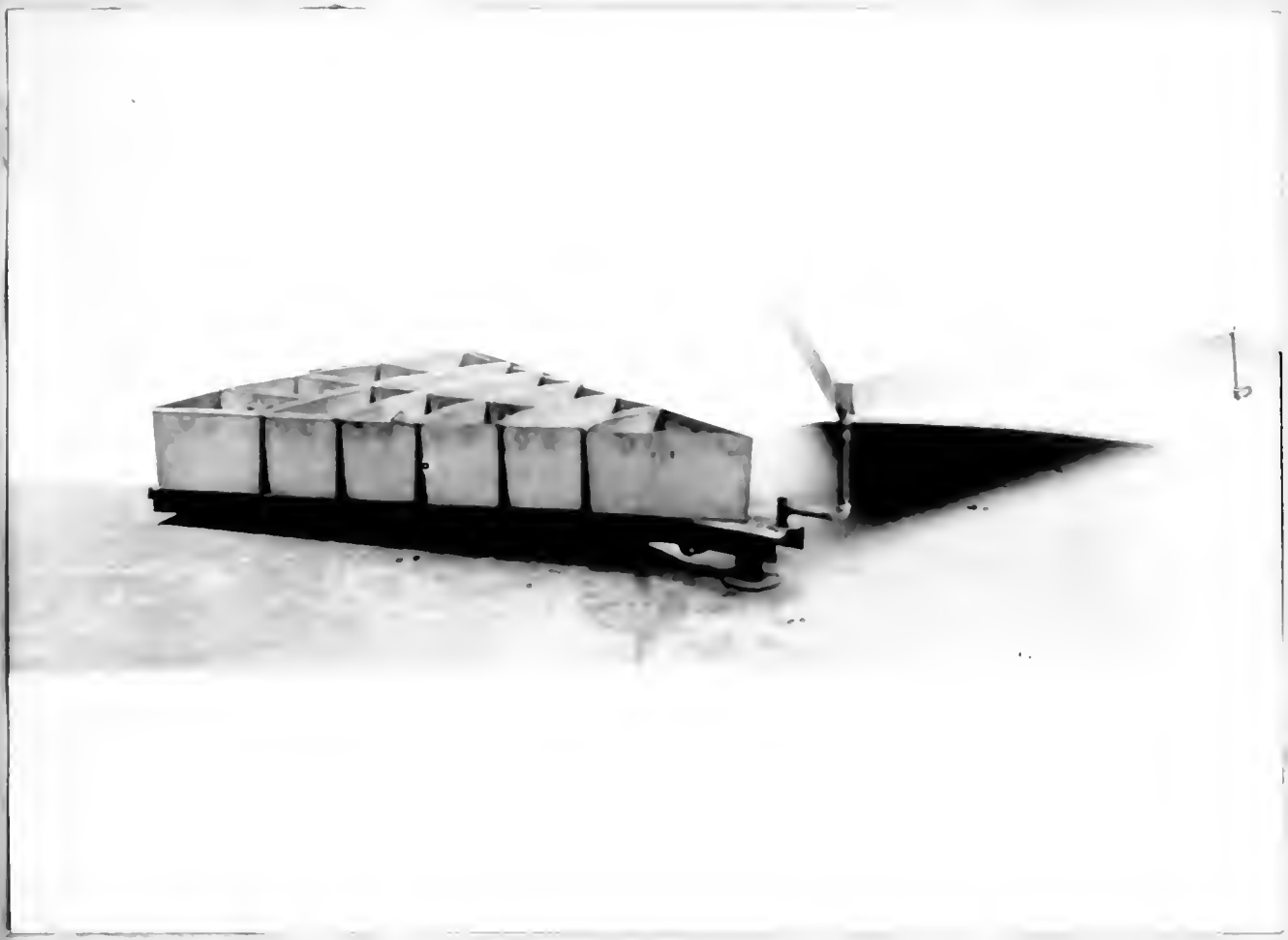


Fig.2.
Pans Uncovered.

Fig.3.

Manufacturers Esty Niagara

Cross-Sectional View of Heads.

TOTAL DISCHARGE DATA

ESTY HEAD

Gauge Press Lbs Sq.In Cor	Velocity Factor Cor. Lbs. Sq.In.	True Press. Lbs. Sq.In.	Discharge Gals.Min.
60	6.85	66.85	44.50
55	6.30	61.30	42.66
50	5.50	55.50	40.30
45	5.10	50.10	38.30
40	4.55	44.55	36.30
35	4.00	39.00	34.00
30	3.60	33.60	32.00
25	2.85	27.85	28.75
20	2.40	22.40	26.30
15	1.90	16.90	23.30
10	1.25	11.25	19.00
9	1.10	10.10	18.00
8	1.05	9.05	17.50
7	.95	7.95	16.60
6	.85	6.85	15.60
5	.77	5.77	14.80
4	.63	4.63	13.30
3	.53	3.53	12.30

NIAGARA HEAD

Gauge Press Lbs Sq.In Cor	Velocity Factor Cor. Lbs. Sq.In.	True Press. Lbs. Sq.In.	Discharge Gals.Min.
60	6.60	66.60	43.60
55	6.15	61.15	42.16
50	5.75	55.75	40.00
45	5.00	50.00	38.00
40	4.50	44.50	36.10
35	4.00	39.00	34.00
30	3.50	33.50	31.60
25	3.00	28.00	28.60
20	2.35	22.35	26.00
15	1.75	16.75	22.60
12	1.45	13.45	20.50
10	1.25	11.25	19.00
8	1.05	9.05	17.50
5	.73	5.73	14.50
3	.5	3.5	12.16

MANUFACTURERS HEAD

Gauge Press Lbs Sq.In Cor	Velocity Factor Cor. Lbs. Sq.In.	True Press. Lbs. Sq.In.	Discharge Gals.Min.
60	6.85	66.85	44.50
55	6.35	61.35	42.80
50	5.70	55.70	40.60
45	5.20	50.20	38.80
40	4.65	44.65	36.60
38	4.75	42.75	37.00
37	4.80	41.80	37.20
36	4.90	40.90	37.53
35	4.95	39.95	37.80
33	4.95	37.95	37.80
30	4.65	34.65	36.60
25	4.3	29.30	33.80
20	3.15	23.15	30.16
15	2.40	17.40	26.30
12	2.00	14.00	24.16
10	1.67	11.67	22.00
8	1.40	9.40	20.16
5	.95	5.95	16.50
3	.68	3.68	14.00

Gauge Calibration Data.

Gauge #60 Model K
Foxboro
0 - 50

True Press.	Obs. Press.
5	5.50
10	10.75
15	15.75
20	20.5
25	25.75
30	30.75
35	35.50
40	40.75
45	45.75
50	50 x

Gauge #61 Model K
Foxboro
0 - 200

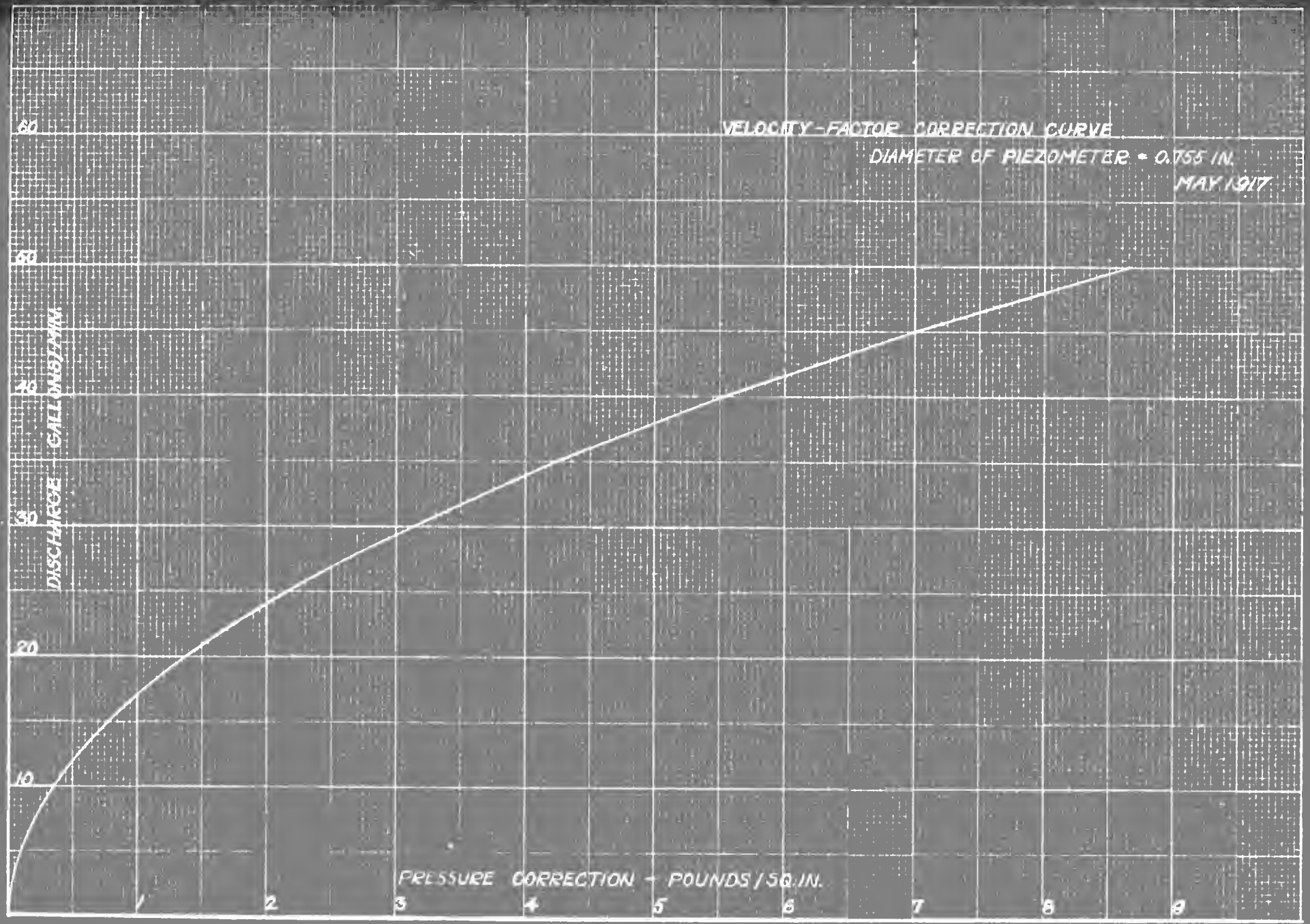
True Press.	Obs.Press.
25	27.00
30	30.00
35	35.00
40	40.50
45	45.00
50	51.00
55	55.00
60	60.00

VELOCITY FACTOR CORRECTION DATA.

Points Calculated for velocity factor correction curve from equation:

$$Pv = .00346623 \times Q^2$$

Gals / Min.	Lbs. / sq. in.
Q	Pv
5	.0866
10	.3466
15	.7799
20	1.3864
25	2.1664
30	3.1196
35	4.2460
40	5.5459
45	7.0190
50	8.6655
55	10.4850
60	12.4784


VELOCITY-FACTOR CORRECTION CURVE
DIAMETER OF PIEZOMETER = 0.755 IN.
MAY 1917
DISCHARGE - GALLONS PER MIN.
PRESSURE CORRECTION - POUNDS / SQ. IN.
60
50
40
30
20
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3
4
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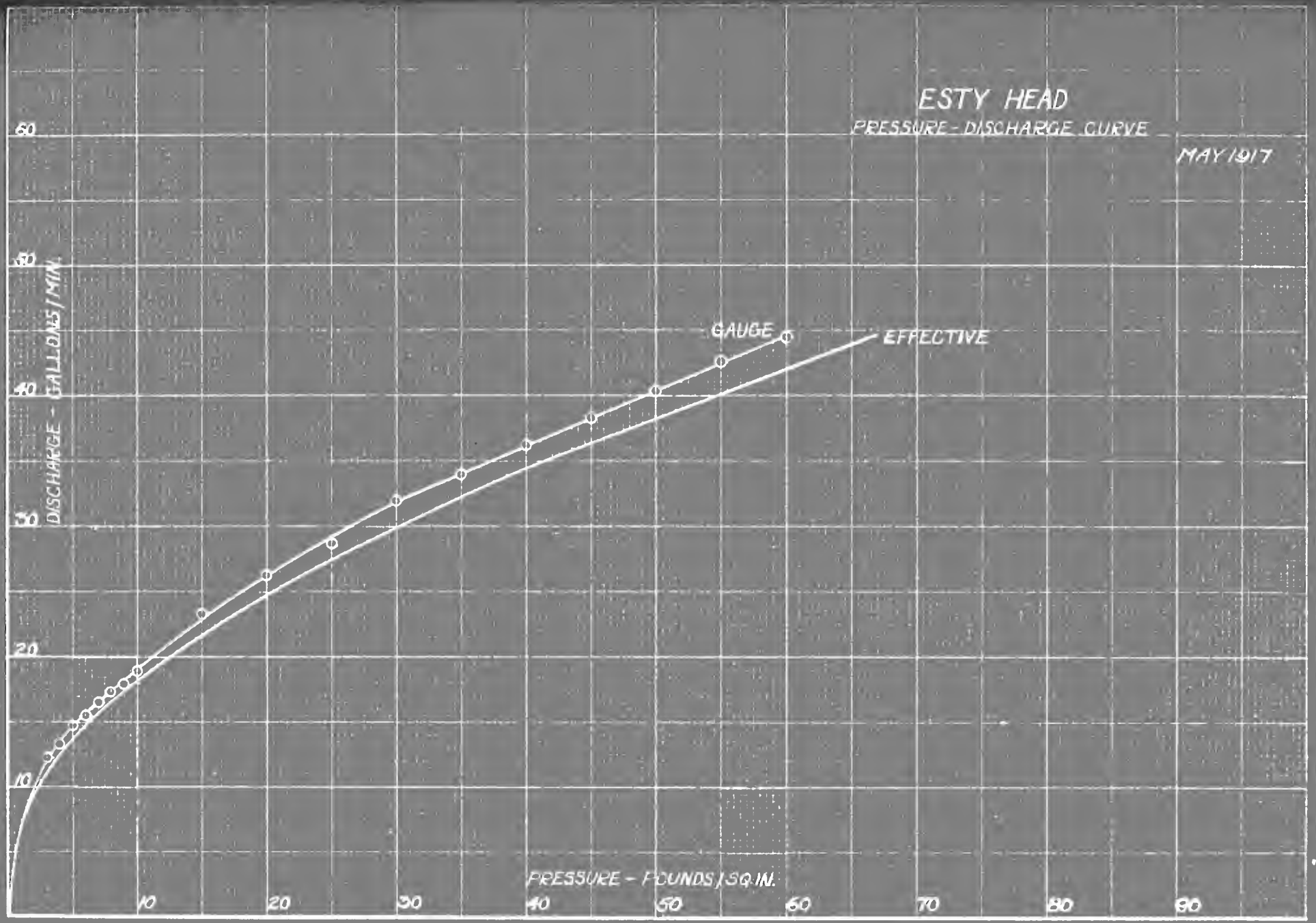
8
9


ESTY HEAD
PRESSURE - DISCHARGE CURVE
MAY 1917
GAUGE
EFFECTIVE
DISCHARGE - GALLONS / MIN.
PRESSURE - POUNDS / SQ. IN.
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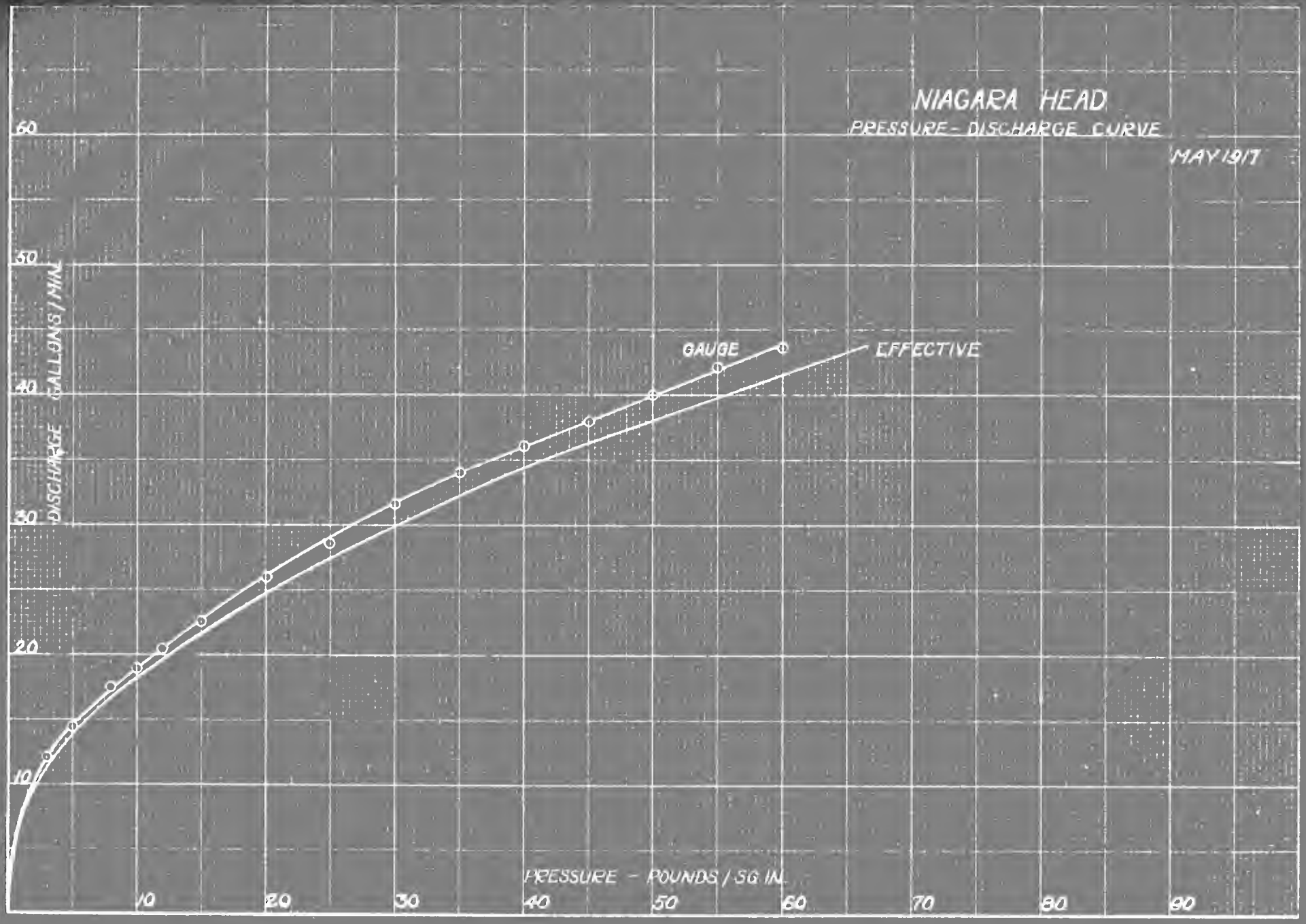
NIAGARA HEAD
PRESSURE - DISCHARGE CURVE
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PRESSURE - POUNDS / SQ IN.
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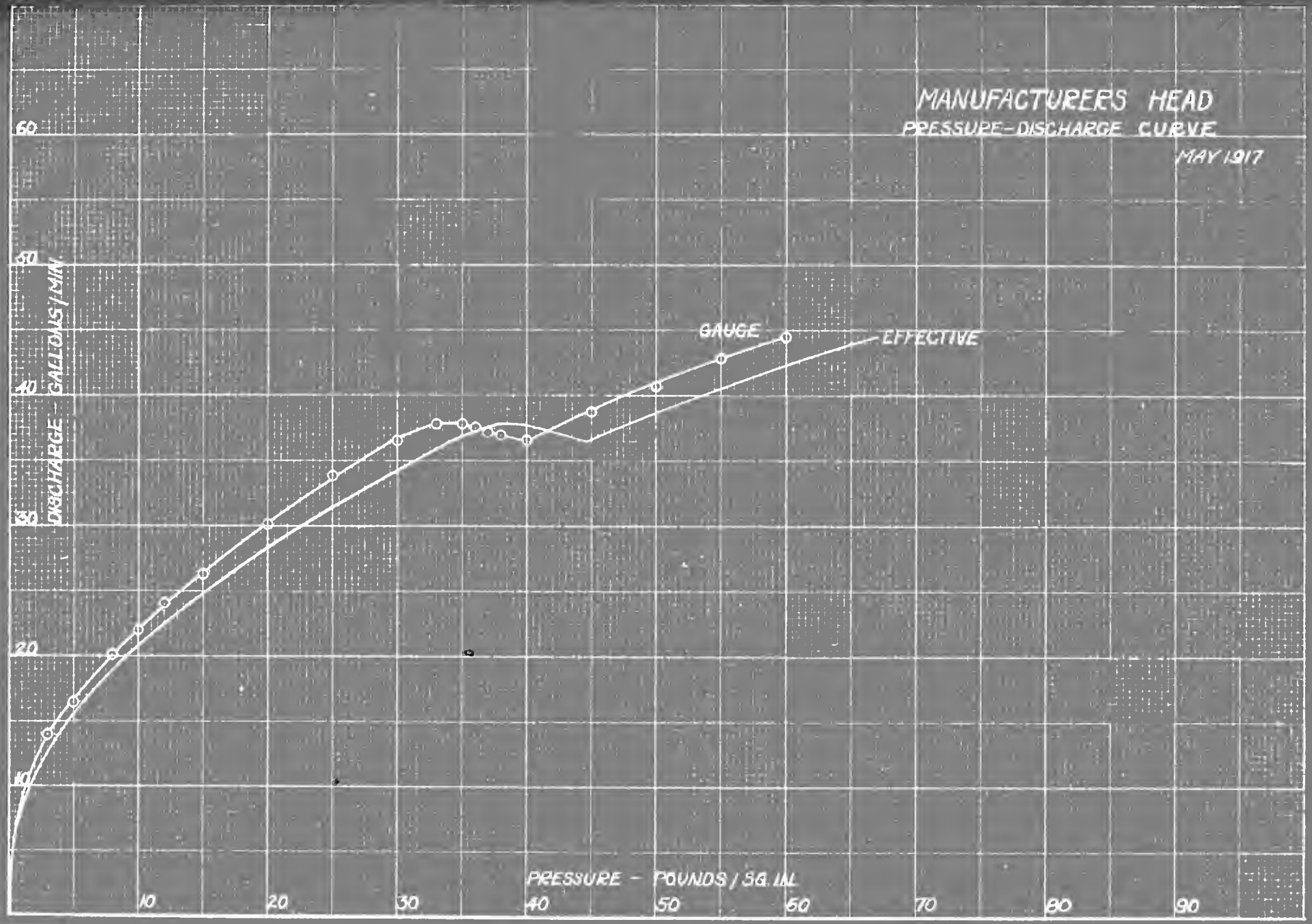
MANUFACTURERS HEAD
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GAUGE
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DISCHARGE - GALLONS / MIN.
PRESSURE - POUNDS / SQ. IN.
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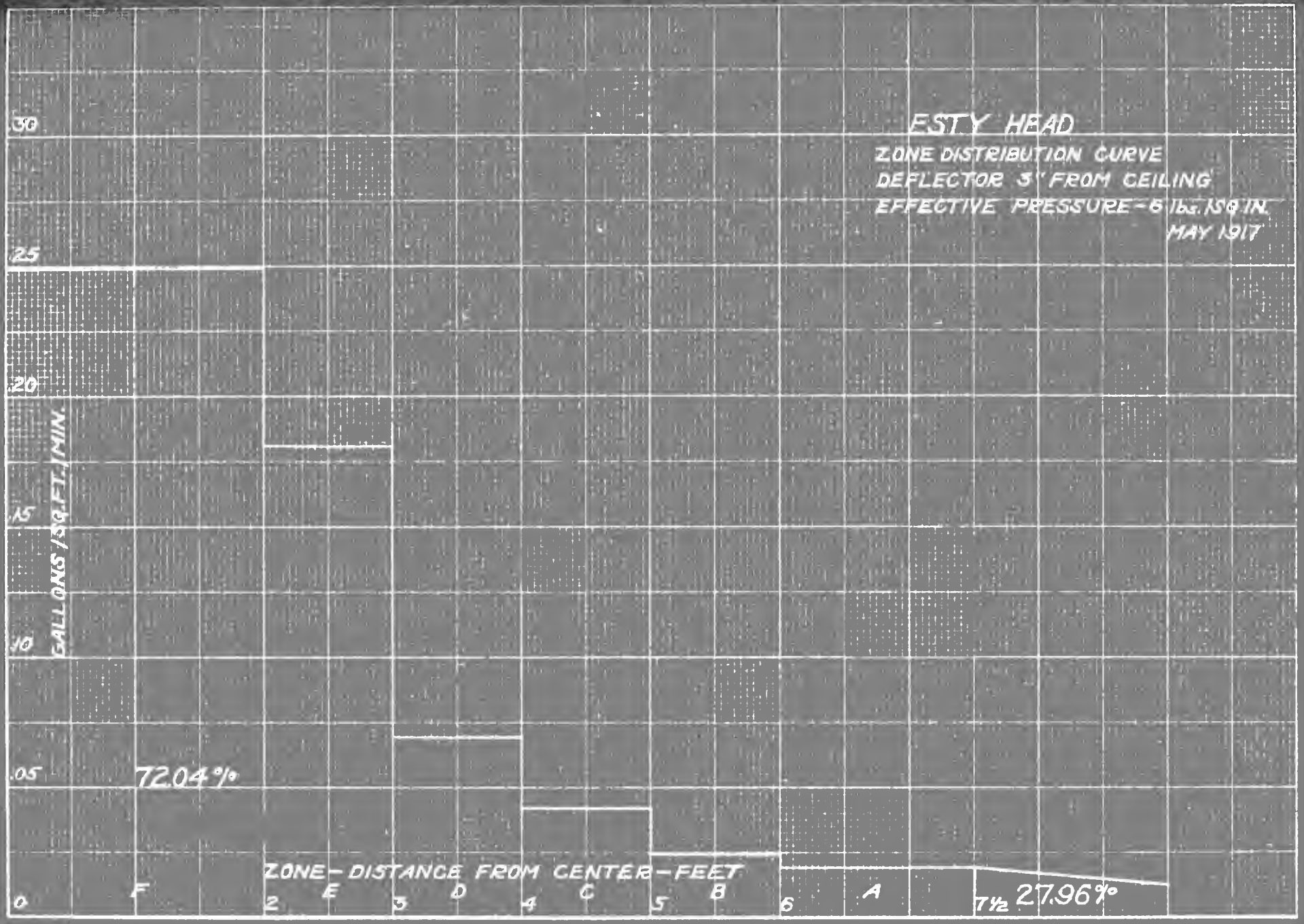
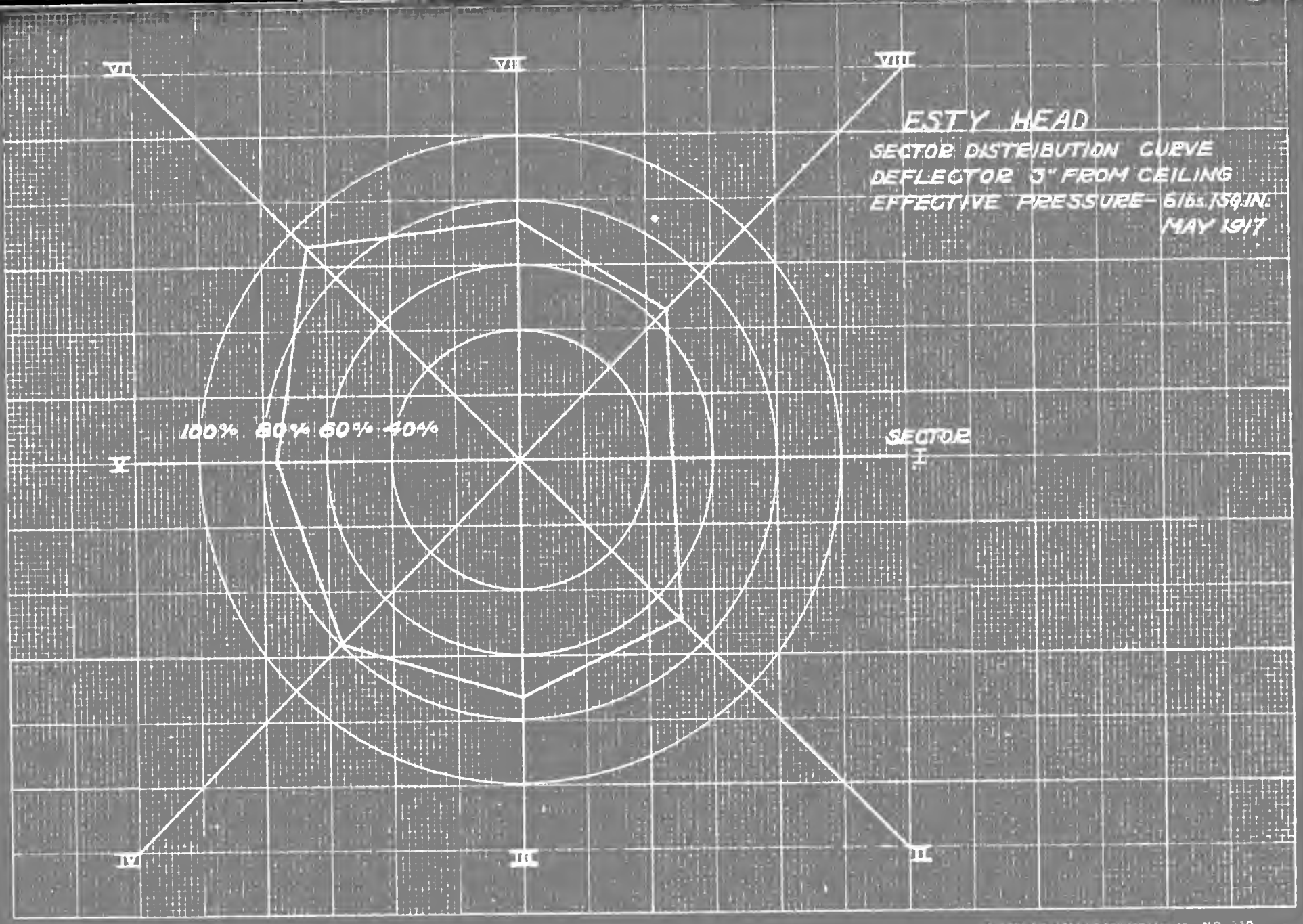
90

E S T Y H E A D

GAUGE PRESSURE, 5 lbs. sq. in; DEFLECTOR 3" FROM CEILING; EFFECTIVE PRESSURE, 6 lbs. sq. in.
5 min. runs.

PANS	SECTORS I	II	III	IV	V	VI	VII	VIII	Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
1	0.50	1.25	2.50	2.00	1.75	1.00	2.00	2.00	13.00				
2	1.25	1.50	1.25	1.75	2.50	2.75	1.25	1.75	14.00				
3	1.75	1.50	0.25	1.75	2.25	2.75	0.75	1.75	12.75	A- 50.25	6.03	.019	8.18
4	1.75	0.25	0.26	2.00	1.25	2.00	0.75	2.25	10.50				
5	1.60	2.10	2.60	2.10	2.60	3.10	2.35	2.10	17.55				
6	2.75	1.75	1.25	2.75	2.25	3.25	1.75	2.25	18.00	B- 35.55	4.26	.0247	5.78
7	2.00	3.25	3.50	2.50	3.00	4.50	3.50	3.75	26.00				
8	2.70	1.70	3.95	2.70	2.20	3.20	3.20	2.70	21.35	C- 47.35	4.68	.042	7.70
9	1.90	5.40	4.40	2.90	3.40	6.90	3.90	4.15	32.95				
10	3.75	2.25	3.25	4.25	2.75	5.25	5.75	3.75	31.00	D- 63.95	7.67	.0698	10.40
11	9.00	13.25	14.00	21.50	15.00	22.00	14.00	9.50	118.25	E-118.25	14.20	.181	19.23
12	7.50	20.00	18.50	15.00	19.50	14.75	18.50	14.00	127.75	F-127.75	15.30	.244	20.75
Total Pounds	36.45	54.20	55.70	61.20	58.45	71.45	57.70	49.95					72.04
Total Gallons	4.37	6.50	6.68	7.35	7.02	8.57	6.83	6.00					
QSector	1.843	1.843	1.843	1.843	1.843	1.843	1.843	1.843	14.75 Gals.				
% in Sector	47.4	70.5	72.4	79.8	76.1	93.0	74.0	65.1					

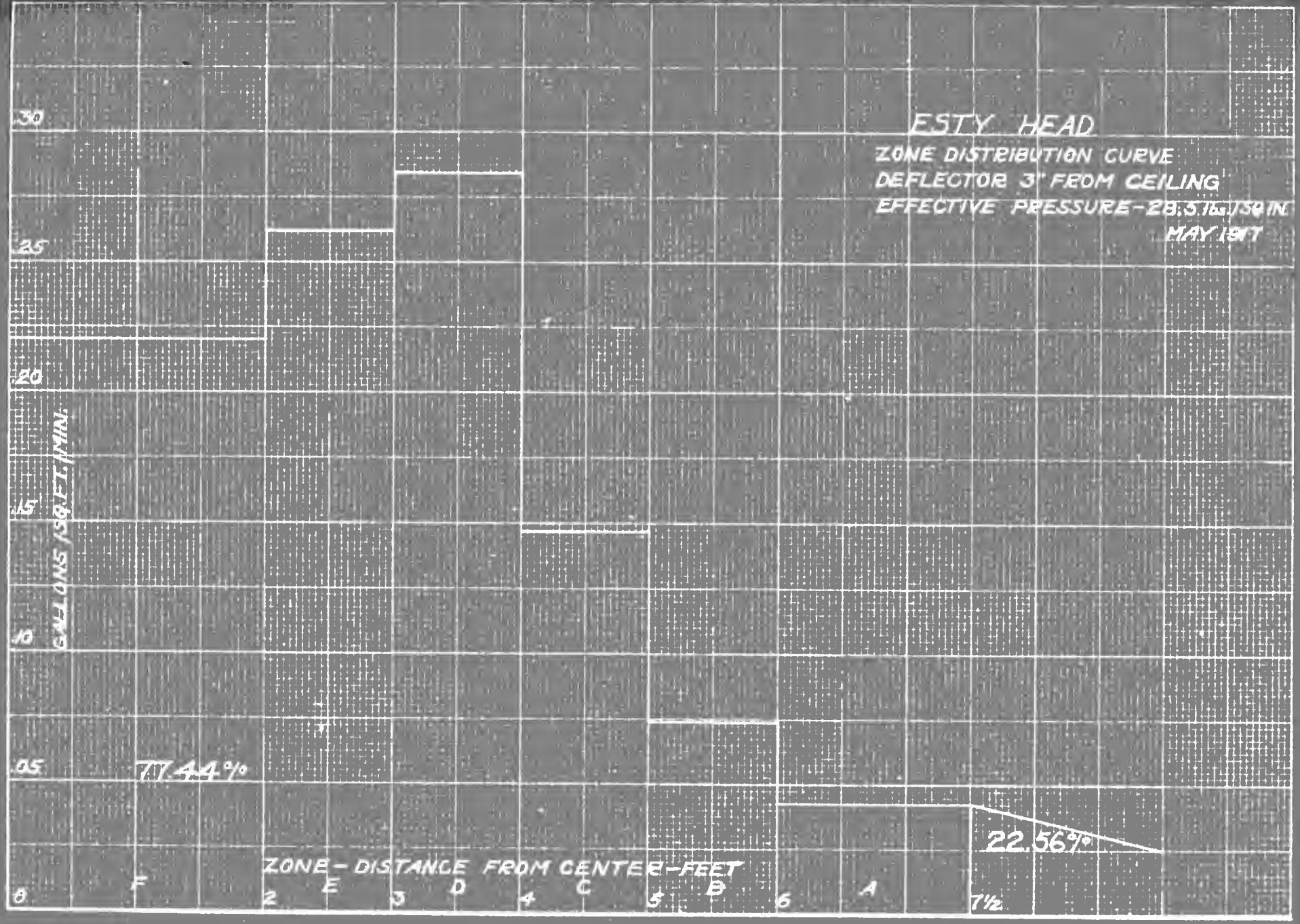

ESTY HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE - 6 lbs. IS¢ IN.
MAY 1917
30
25
20
15
10
.05
GALLONS / SQ. FT. / MIN.
72.04%
ZONE - DISTANCE FROM CENTER - FEET
0
F
2
E
3
D
4
C
5
B
6
A
7½
27.96%

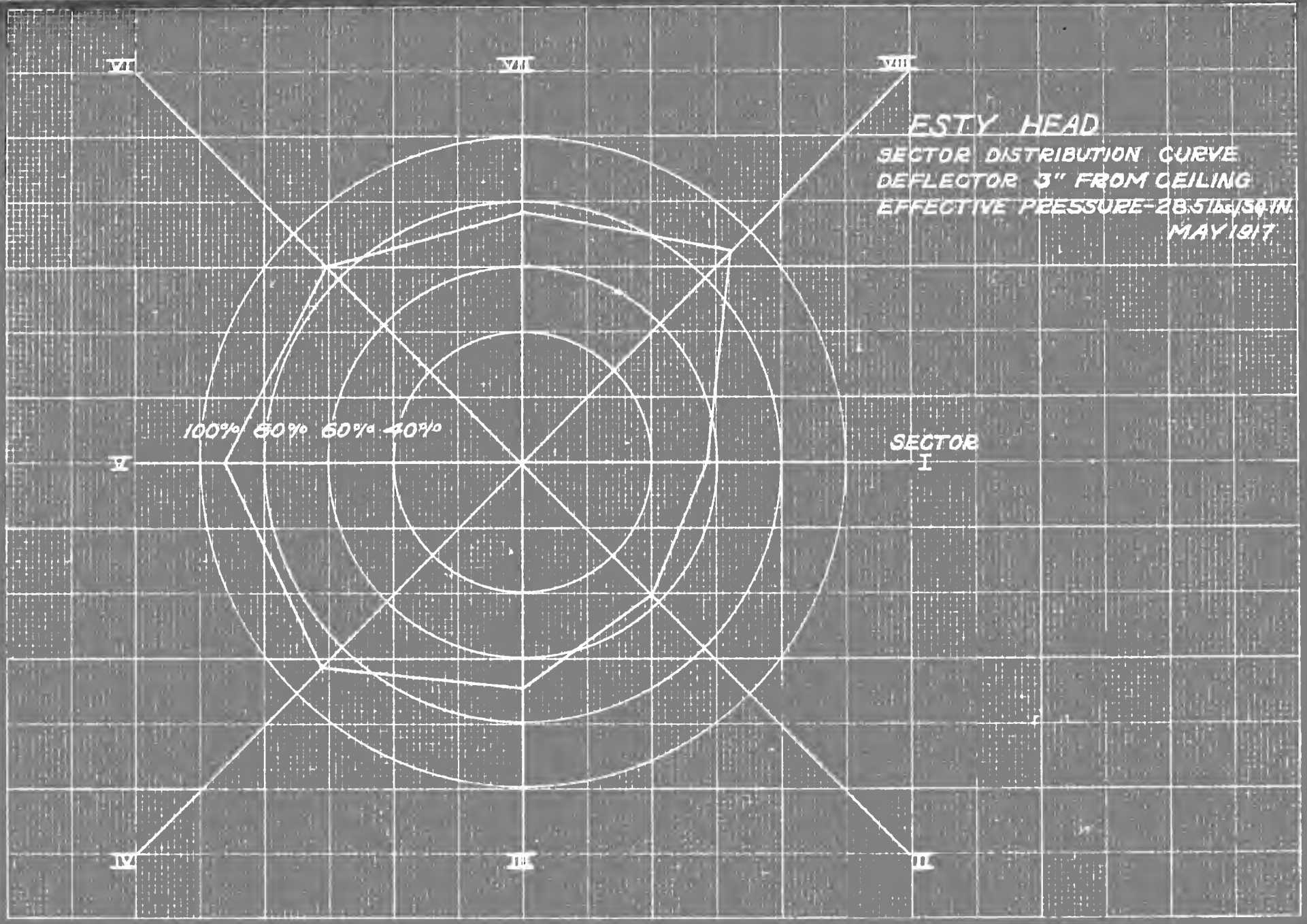

VII
VI
VIII
ESTY HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE- 6 lbs. /SQ.IN.
MAY 1917
100% 80% 60% 40%
SECTOR
I
X
IV
III
II

E S T Y H E A D

GAUGE PRESSURE, 25 lbs. sq. in; DEFLECTOR 3" FROM CEILING; EFFECTIVE PRESSURE, 28.5 lbs. sq. in.
5 min. runs.

	S E C T O R S								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	1.00	0.75	4.00	4.50	4.50	2.00	3.50	5.00	25.25				
2	3.75	1.25	1.75	5.75	7.25	3.25	2.75	4.25	30.00				
3	5.25	1.75	0.50	5.75	8.25	4.75	1.75	5.25	33.25	A-113.50	13.6	.0428	9.3
4	4.25	1.50	0.25	5.25	3.75	4.25	1.75	4.00	25.00				
5	8.10	2.35	5.10	9.60	9.60	6.10	5.60	11.60	58.05				
6	1.00	3.25	1.50	8.75	11.25	8.25	5.75	8.75	48.50	B-106.55	12.8	.0742	8.75
7	10.50	4.50	16.75	15.00	15.50	8.50	7.50	15.50	93.75				
8	1.70	5.20	4.95	21.70	17.70	10.20	6.20	12.20	79.85	C-173.60	20.8	.147	14.21
9	6.90	7.90	19.90	24.90	18.90	13.40	21.90	20.40	134.20				
10	19.75	14.25	4.00	17.25	16.50	22.75	5.75	25.25	125.50	D-259.70	31.2	.284	21.5
11	13.50	29.00	25.50	7.00	9.50	28.00	36.50	21.50	170.50	E-170.50	20.5	.262	14.2
12	11.00	15.50	20.00	9.50	17.50	18.00	18.00	6.00	115.50	F-115.50	13.86	.22	9.48
Total Pounds	86.70	87.20	104.20	134.95	140.20	129.45	116.95	139.70					77.44
Total Gallons	10.4	10.46	12.5	16.2	16.8	15.54	14.05	16.75					
Q Sector	3.656	3.656	3.656	3.656	3.656	3.656	3.656	3.656	29.25 Gals.				
% in Sector	56.9	57.2	68.4	88.7	92.	85.1	76.8	91.6					


ESTY HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE-28.5 TO 30 IN
MAY 1917
30
25
20
15
10
05
GALLONS PER SQ. FT. PER MIN.
TAT 4.4%
22.56%
ZONE - DISTANCE FROM CENTER - FEET
0
F
2
E
3
D
4
C
5
B
6
A
7½



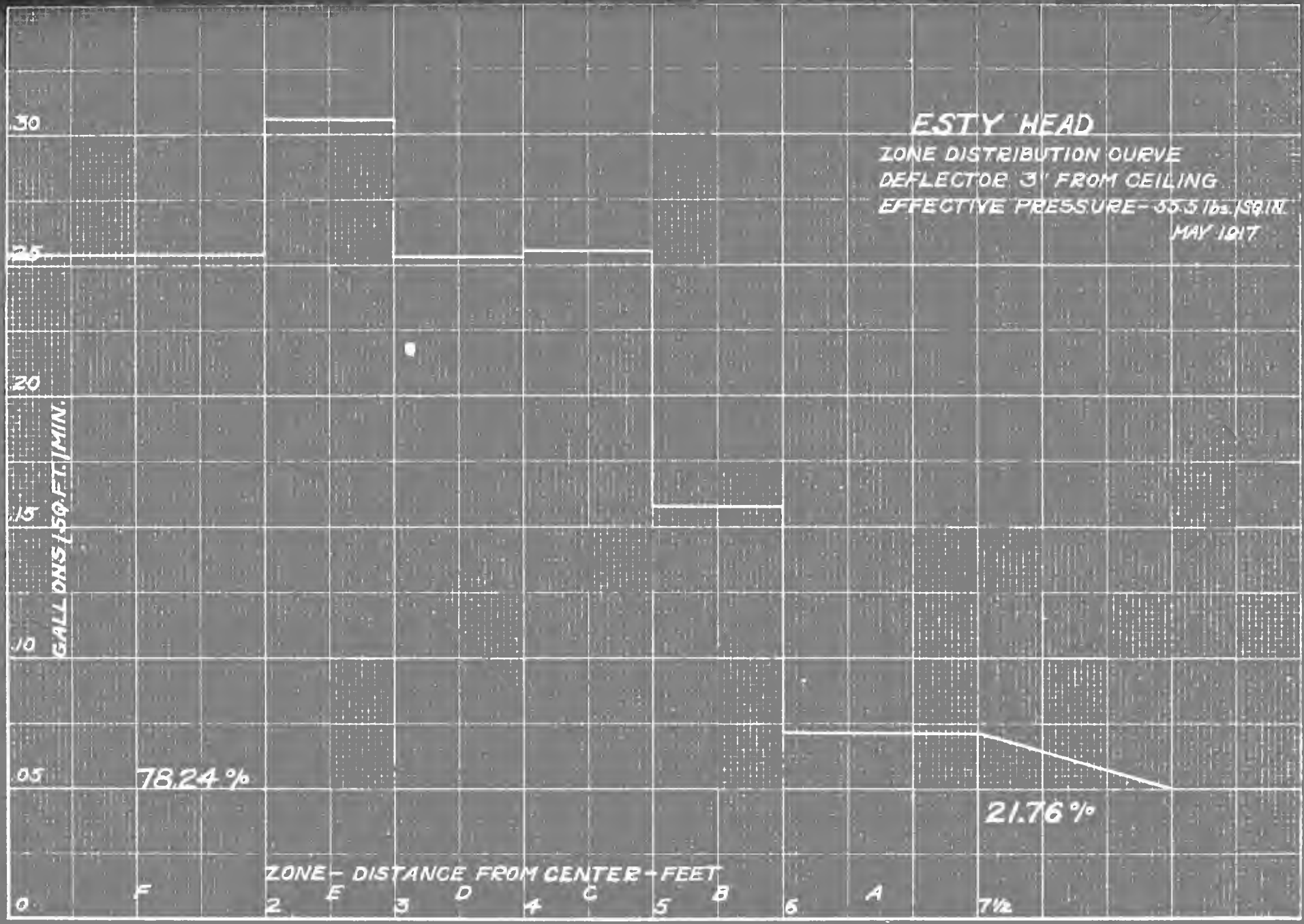
ESTY HEAD

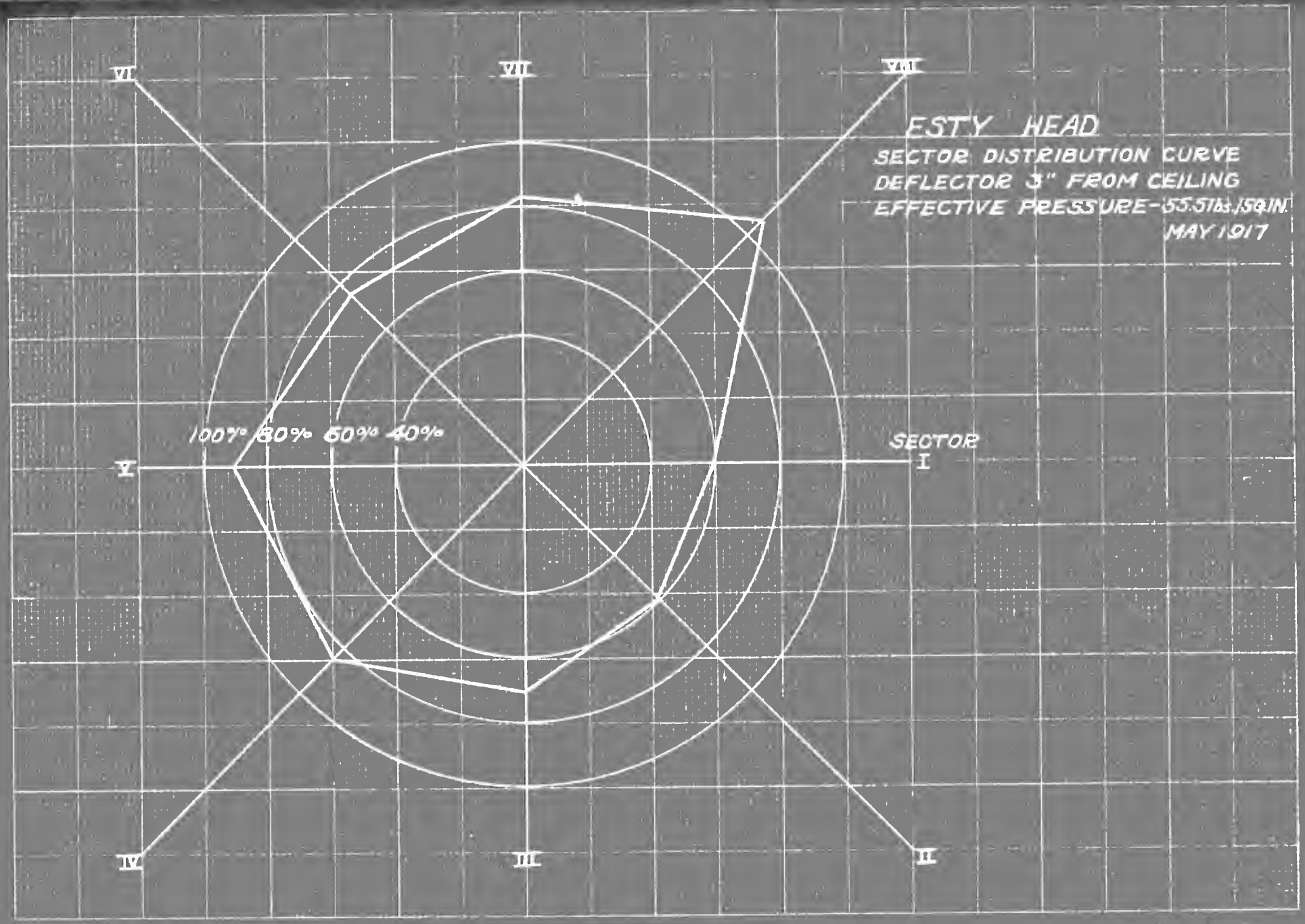
SECTOR DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE-28.5 LBS/SQ IN.
MAY 1917

E S T Y H E A D

GAUGE PRESSURE, 50 lbs. sq. in; DEFLECTOR 3" FROM CEILING; EFFECTIVE PRESSURE, 55.5 lbs. sq. in.
5 min. runs.

PANS	SECTORS I	II	III	IV	V	VI	VII	VIII	Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
1	1.0	1.0	7.0	8.0	5.5	1.5	7.75	10.25	42.0				
2	2.25	1.75	1.75	10.75	9.75	3.25	2.75	11.75	44.0	A-189.25	22.75	.0715	11.23
3	9.25	2.25	0.75	10.25	13.75	6.25	2.25	11.25	56.0				
4	8.50	1.75	0.25	8.75	8.75	6.25	1.75	11.25	47.25				
5	3.60	3.1	19.1	20.6	19.1	7.6	17.1	19.6	109.8	B-262.3	31.48	.182	15.54
6	31.75	4.25	2.25	35.75	28.75	12.75	6.25	30.75	152.5				
7	7.50	6.5	26.0	32.0	23.5	13.50	23.5	33.0	165.5	C-303.1	36.37	.257	17.96
8	16.7	12.2	6.7	13.2	23.2	28.70	6.7	30.2	137.6				
9	10.9	16.4	23.4	11.9	14.4	15.9	15.4	25.9	134.2	D-232.2	27.86	.253	13.75
10	4.75	28.75	6.75	5.75	9.25	20.25	11.25	11.25	98.0				
11	21.0	31.50	34.0	9.5	10.5	23.5	51.0	19.0	200.	E-200.	24.	.306	11.85
12	7.0	14.5	18.0	13.0	23.0	18.0	28.0	12.0	133.5	F-133.5	16.02	.255	7.91
													78.24
Total Pounds	124.20	123.95	145.95	179.45	189.45	157.45	173.70	226.20					
Total Gallons	14.90	14.87	17.50	21.55	22.75	18.9	20.85	27.15					
QSector	5.0625	5.0625	5.0625	5.0625	5.0625	5.0625	5.0625	5.0625	40.5 Gals.				
% in Sector	58.8	58.7	69.2	85.2	90.0	74.7	82.4	107.3					

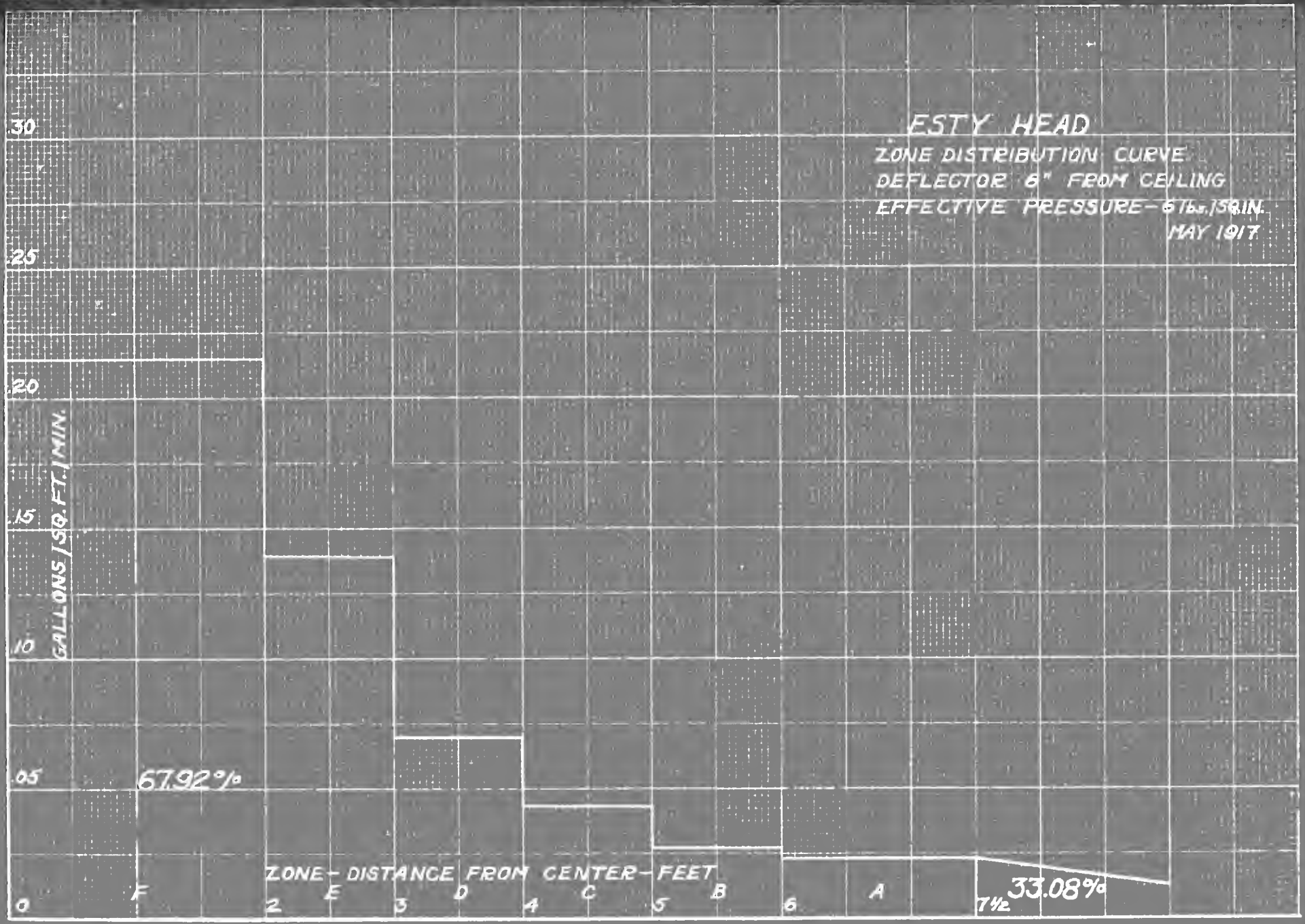

ESTY HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE - 55.5 lbs. / SQ. IN.
MAY 1917
GALLONS PER SQ. FT. / MIN.
30
25
20
15
10
05
0
78.24 %
21.76 %
ZONE - DISTANCE FROM CENTER - FEET
F
2
E
3
D
4
C
5
B
6
A
7½

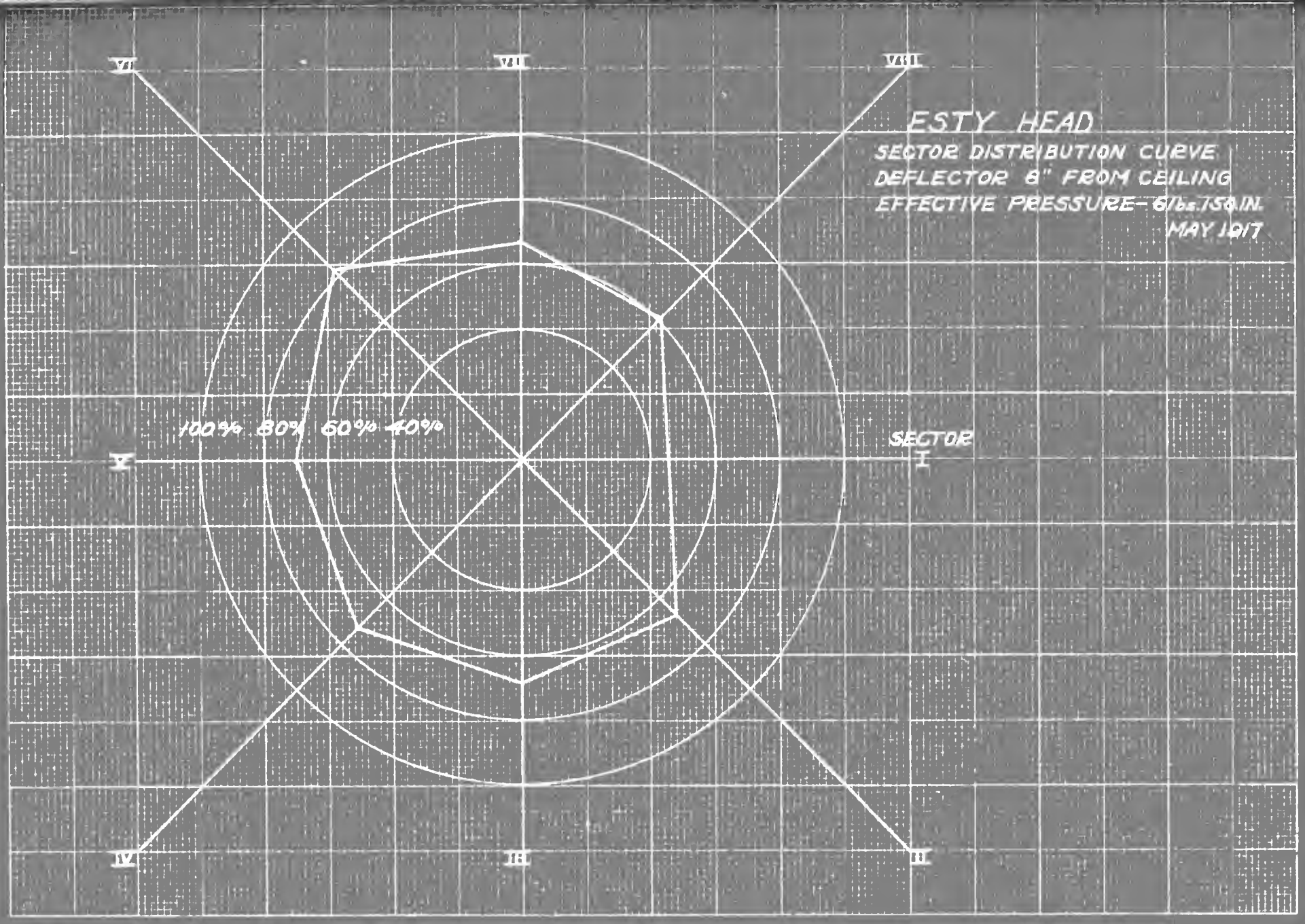

ESTY HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE-55.5 lbs./SQ.IN.
MAY 1917
VII
VII
VIII
100% 80% 60% 40%
SECTOR
I
V
IV
III
II

E S T Y H E A D

GAUGE PRESSURE, 5 lbs. sq. in; DEFLECTOR 6" FROM CEILING; EFFECTIVE PRESSURE, 6 lbs. sq. in.
5 min. runs.

	S E C T O R S												
PANS	I	II	III	IV	V	VI	VII	VIII	Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
1	0.50	.75	3.00	2.50	2.00	1.00	2.00	2.00	13.75				
2	1.25	2.00	1.50	2.25	2.25	3.25	1.25	1.25	15.00	A- 53.75	6.45	.023	8.75
3	1.75	1.75	0.75	2.25	2.25	3.00	0.75	1.75	14.25				
4	1.75	0.50	0.25	2.75	1.25	1.75	0.75	1.75	10.75				
5	1.60	2.35	2.60	2.60	2.60	3.10	2.60	2.10	19.55				
6	2.75	2.00	1.25	3.25	2.25	3.25	2.25	2.25	19.25	B- 38.80	4.65	.0269	6.30
7	2.00	3.50	3.50	2.75	3.00	5.00	3.00	3.75	26.50				
8	3.70	2.45	3.45	2.95	1.70	3.20	4.20	3.20	24.95	C- 51.45	6.17	.0436	8.37
9	1.92	5.40	5.65	2.90	3.40	6.90	3.40	4.40	33.95				
10	3.75	3.25	3.75	3.50	2.75	5.75	3.75	3.75	30.25	D- 64.20	7.7	.07	10.44
11	8.00	14.50	11.00	12.25	10.00	16.50	9.00	9.50	90.75	E- 90.75	10.88	.139	14.76
12	6.00	13.50	15.50	16.50	20.50	11.00	18.00	11.50	112.50	F-112.50	13.5	.215	18.30
Total Pounds	34.95	51.95	52.20	56.45	53.95	63.70	50.95	47.20					66.92
Total Gallons	4.2	6.23	6.27	6.77	6.48	7.64	6.11	5.66					
QSector	1.843	1.843	1.843	1.843	1.843	1.843	1.843	1.843	14.75 Gals.				
% in Sector	45.6	67.5	68.	73.4	70.3	82.8	66.3	61.4					

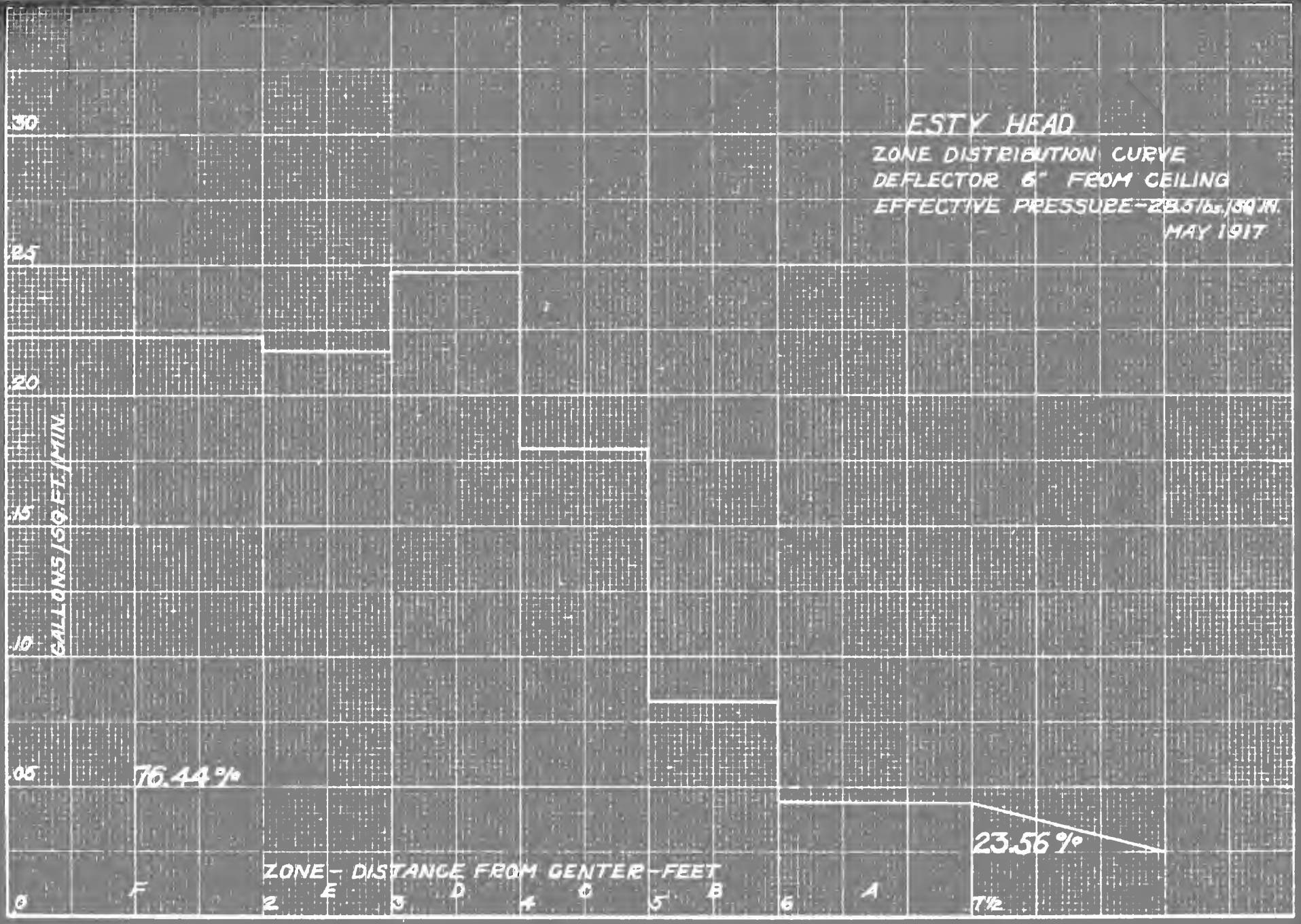

ESTY HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE - 6 Lbs. / SQ. IN.
MAY 1917
30
25
20
15
10
05
0
GALLONS / SQ. FT. / MIN.
67.92%
33.08%
ZONE - DISTANCE FROM CENTER - FEET
F
2
E
3
D
4
C
5
B
6
A
7½

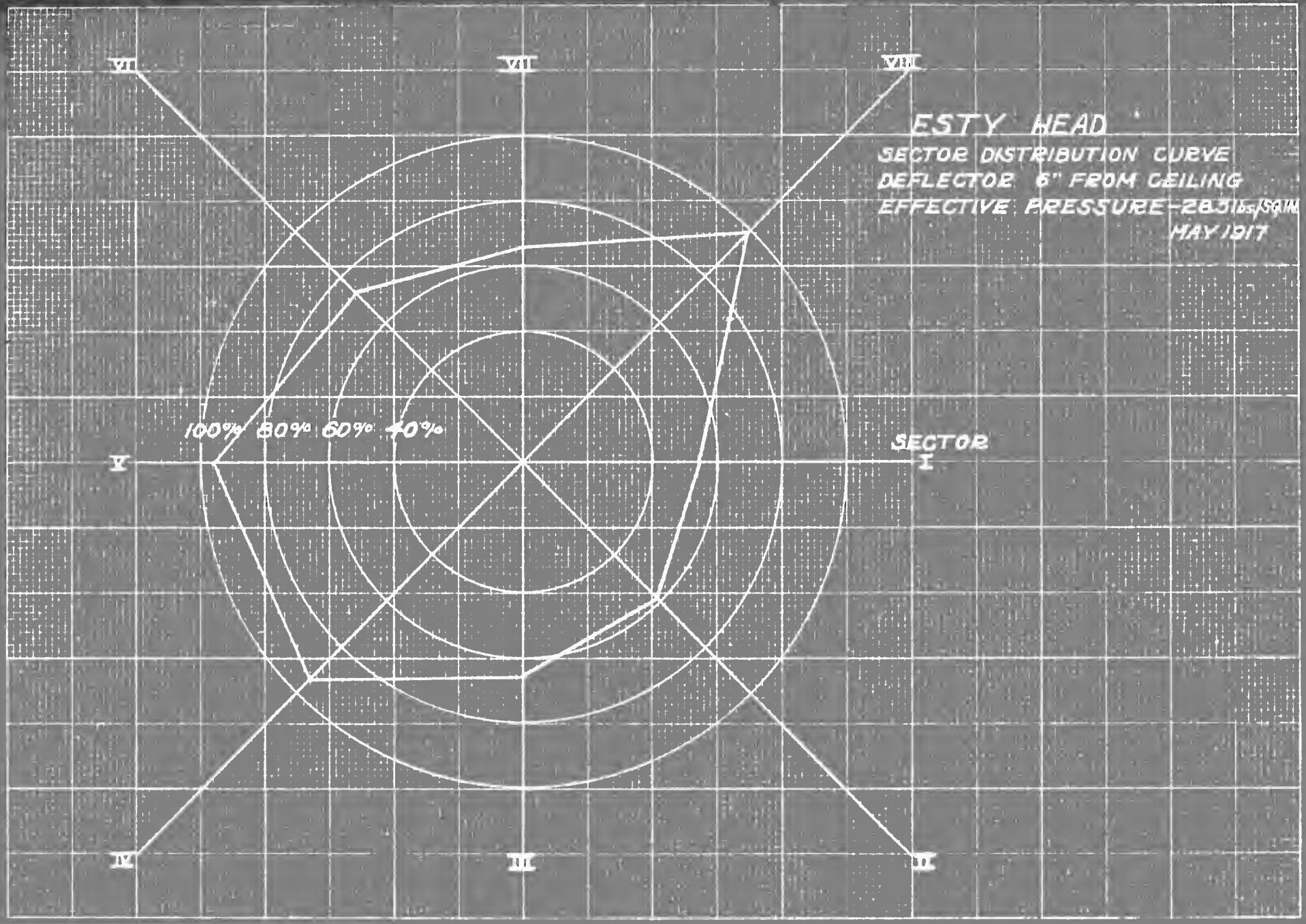

VI
VII
VIII
ESTY HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 8" FROM CEILING
EFFECTIVE PRESSURE-6 lbs. 150 IN.
MAY 1917
100% 80% 60% 40%
V
SECTOR
I
IV
III
II

E S T Y H E A D

GAUGE PRESSURE, 25 lbs. sq. in; DEFLECTOR 6" FROM CEILING; EFFECTIVE PRESSURE, 28.5 lbs. sq. in.
5 min. runs.

PANS	SECTORS I	II	III	IV	V	VI	VII	VIII	Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
1	1.00	0.50	4.00	6.50	3.50	2.00	3.00	7.50	28.00				
2	1.75	1.25	1.25	6.75	6.00	2.75	1.75	6.75	28.25				
3	2.75	2.75	0.25	5.25	8.75	5.25	1.25	5.75	32.00	A-115.50	13.88	.0436	9.5
4	4.75	1.75	0.25	4.75	6.00	4.75	1.25	3.75	27.25				
5	2.60	2.10	6.10	13.10	9.10	6.10	5.60	13.60	58.30				
6	6.75	4.75	1.25	10.75	13.50	9.25	4.75	10.25	61.25	B-119.55	14.34	.083	9.8
7	3.50	3.50	21.50	19.50	17.00	8.00	8.50	17.00	98.50				
8	12.70	7.20	4.70	23.70	19.95	13.20	6.20	15.70	103.35	C-211.85	25.4	.1795	17.37
9	3.90	7.40	12.90	19.90	14.90	7.90	22.90	17.40	107.20				
10	17.25	23.25	4.75	11.75	14.50	21.75	4.75	20.75	118.75	D-225.95	27.15	.247	18.55
11	13.50	16.50	25.50	10.50	9.50	20.50	22.00	24.00	142.00	E-142.	17.05	.217	11.66
12	13.00	18.00	16.50	10.50	22.50	10.50	17.50	8.00	116.50	F-116.50	13.98	.223	9.56
Total Pounds	83.45	88.95	98.95	142.95	145.20	111.95	99.45	150.45					76.44
Total Gallons	10.01	10.67	11.9	17.15	17.43	13.45	11.93	18.05					
QSector	3.656	3.656	3.656	3.656	3.656	3.656	3.656	3.656	29.25 Gals.				
% in Sector	54.75	58.4	65.15	93.9	95.5	73.6	65.16	98.8					

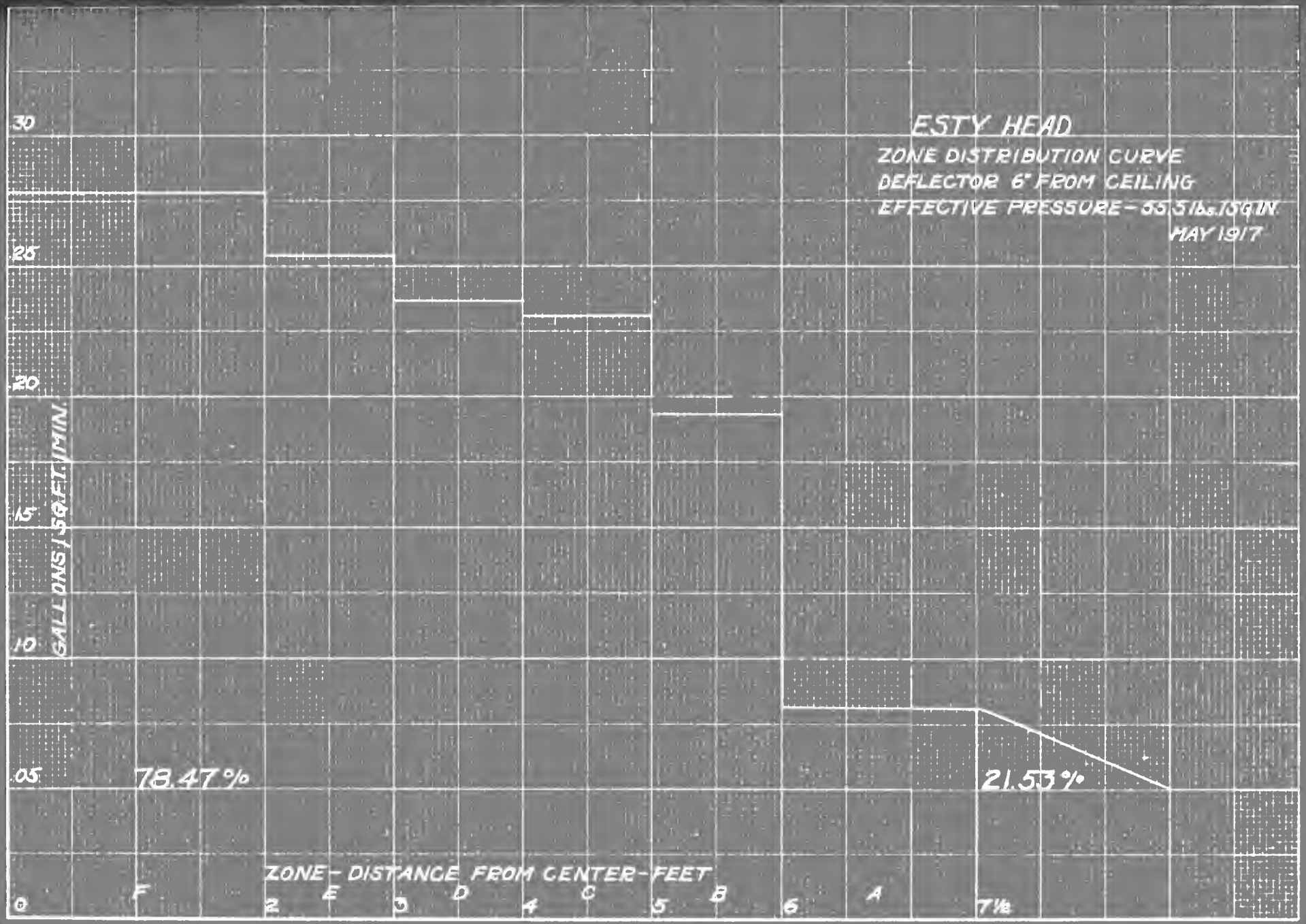

ESTY HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE - 28.5 lbs./sq.in.
MAY 1917
GALLONS / SQ.FT. / MIN.
.30
.25
.20
.15
.10
.05
0
76.44 %
23.56 %
ZONE - DISTANCE FROM CENTER - FEET
F
2
E
3
D
4
C
5
B
6
A
7½

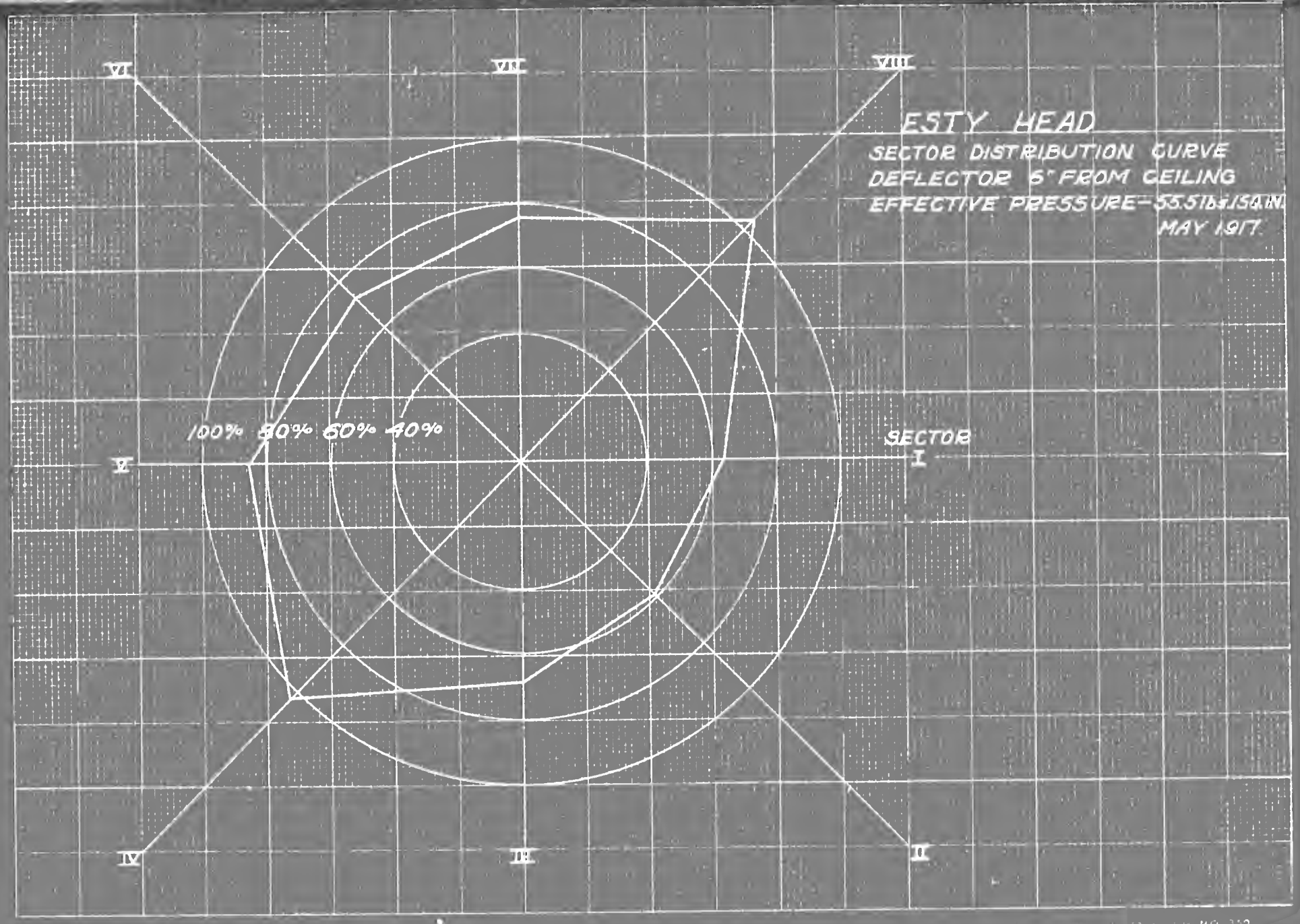

VI
VII
VIII
ESTY HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE-28.3 lbs./SQ.IN.
MAY 1917
100% 80% 60% 40%
SECTOR
I
V
IV
III
II

E S T Y H E A D

GAUGE PRESSURE, 50 lbs. sq. in; DEFLECTOR 6" FROM CEILING; EFFECTIVE PRESSURE, 55.5 lbs. sq. in.
5 min. runs.

	SECTORS								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	0.75	0.75	7.0	13.3	4.5	1.5	7.0	11.0	45.80				
2	2.25	2.00	2.0	15.25	9.75	4.25	2.75	13.75	52.00				
3	10.25	3.00	0.5	13.75	14.25	7.25	1.75	12.75	63.5	A-214.05	25.69	.0807	12.68
4	11.75	1.75	0.5	11.75	9.25	5.25	1.75	10.75	52.75				
5	5.1	2.85	19.1	25.60	18.35	8.10	17.10	19.60	115.8				
6	34.25	5.25	2.25	39.25	29.00	15.75	6.25	32.00	164.0	B-279.8	33.58	.1943	16.58
7	10.00	6.5	26.5	34.0	20.5	13.0	24.5	29.5	164.5				
8	12.2	16.7	7.2	14.7	18.7	32.95	7.95	27.2	137.6	C-302.1	36.25	.2565	17.9
9	10.9	14.65	18.4	12.4	14.4	13.90	16.90	21.9	123.45				
10	6.25	24.25	7.75	8.75	8.75	16.25	8.75	12.75	93.5	D-216.95	26.03	.2367	12.85
11	17.00	24.50	29.00	11.00	11.50	16.50	36.50	20.00	166.	E-166.	19.92	.2540	9.83
12	9.00	19.50	22.25	18.50	20.00	17.00	28.00	11.50	145.75	F-145.75	17.49	.2785	8.63
Total Pounds	129.70	121.70	142.45	218.25	178.95	151.70	159.20	222.70					78.47
Total Gallons	15.56	14.6	17.1	26.2	21.45	18.2	19.1	26.7					
QSector	5.0625	5.0625	5.0625	5.0625	5.0625	5.0625	5.0625	5.0625	40.5 Gals.				
% in Sector	61.5	57.7	67.6	103.6	84.8	71.9	75.5	105.5					


ESTY HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE - 55.3 lbs. /SQ IN.
MAY 1917
30
25
20
15
10
05
0
GALLONS / SQ FT / MIN.
78.47 %
21.53 %
ZONE - DISTANCE FROM CENTER - FEET
F
2
E
3
D
4
C
5
B
6
A
7½

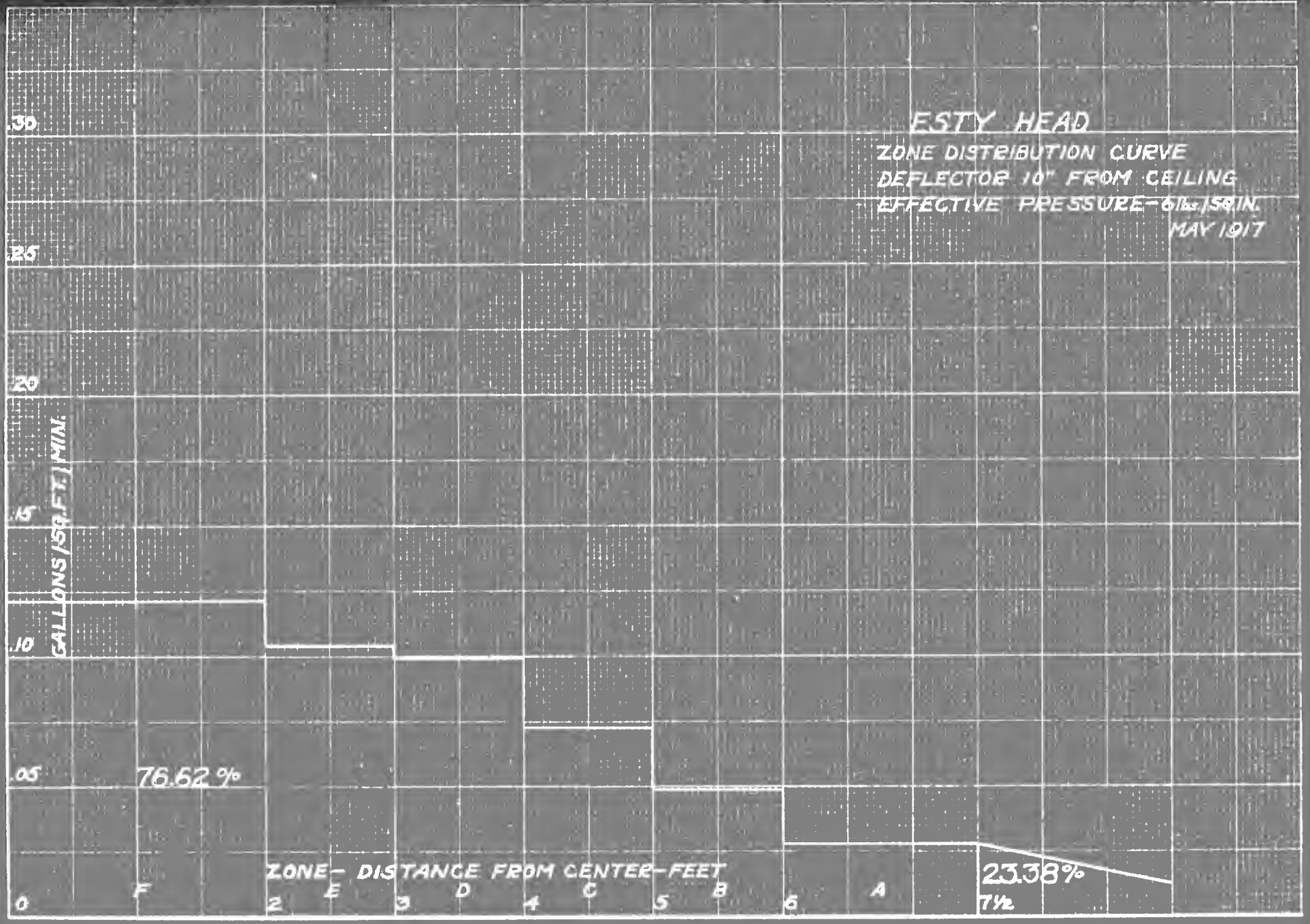


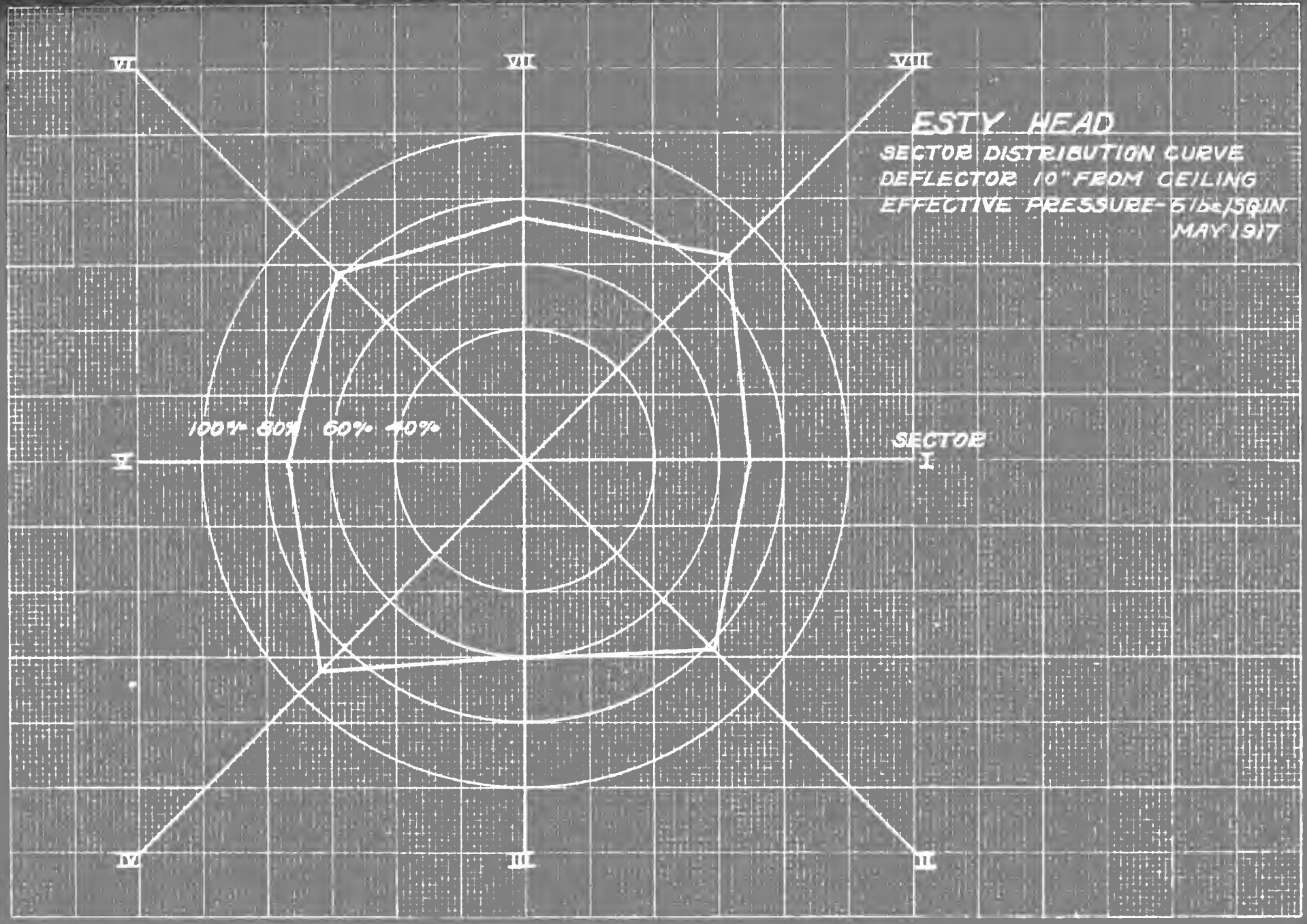
ESTY HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 5" FROM CEILING
EFFECTIVE PRESSURE=55.5 lbs/154 IN.
MAY 1917.

E S T Y H E A D

GAUGE PRESSURE, 5 lbs. sq. in; DEFLECTOR 10" FROM CEILING; EFFECTIVE PRESSURE 6 lbs. sq. in.
7 min. runs.

PANS	SECTORS I	II	III	IV	V	VI	VII	VIII	Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
1	4.75	4.00	4.25	2.50	4.50	4.50	4.50	2.25	31.25				
2	3.25	3.75	3.25	1.50	2.50	4.75	2.75	2.25	24.00				
3	2.50	3.25	2.75	1.25	2.50	4.25	2.25	2.25	21.00	A-102.50	12.3	.0276	11.9
4	3.75	3.75	4.25	1.75	2.25	4.25	3.25	3.00	26.25				
5	5.60	6.10	4.10	7.10	4.60	6.60	4.60	7.60	46.30				
6	4.75	6.00	5.75	4.50	3.00	6.75	5.25	6.50	42.50	B- 88.80	10.66	.0442	10.34
7	6.50	7.50	4.00	13.50	5.25	8.00	4.50	14.50	63.75				
8	4.70	5.95	4.95	10.45	2.70	8.20	5.95	13.20	56.10	C-119.85	14.37	.0727	13.9
9	7.90	8.90	3.40	12.65	5.65	7.65	4.90	18.65	69.70				
10	6.25	7.75	7.75	9.75	2.50	7.75	7.75	6.50	56.00	D-125.70	15.08	.098	14.6
11	11.50	18.00	10.00	13.00	7.75	10.50	14.50	10.25	95.50	E- 95.50	11.46	.104	11.1
12	12.50	14.25	10.00	19.25	31.00	13.50	18.25	8.25	127.00	F-127.	15.24	.1215	14.78
Total Pounds	73.95	89.20	64.45	97.20	74.20	86.70	78.45	95.20					76.62
Total Gallons	8.88	10.7	7.73	11.66	8.9	10.4	9.41	11.42					
QSector	1.843	1.843	1.843	1.843	1.843	1.843	1.843	1.843	14.75 Gals.				
% in Sector	68.8	83.	59.9	90.4	71.8	80.7	72.9	88.5					


ESTY HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE-6 LBS/SQ.IN.
MAY 1917
.30
.25
.20
.15
.10
.05
GALLONS/SQ.FT./MIN.
76.62 %
23.38%
7½
ZONE- DISTANCE FROM CENTER-FEET
0
F
2
E
3
D
4
C
5
B
6
A



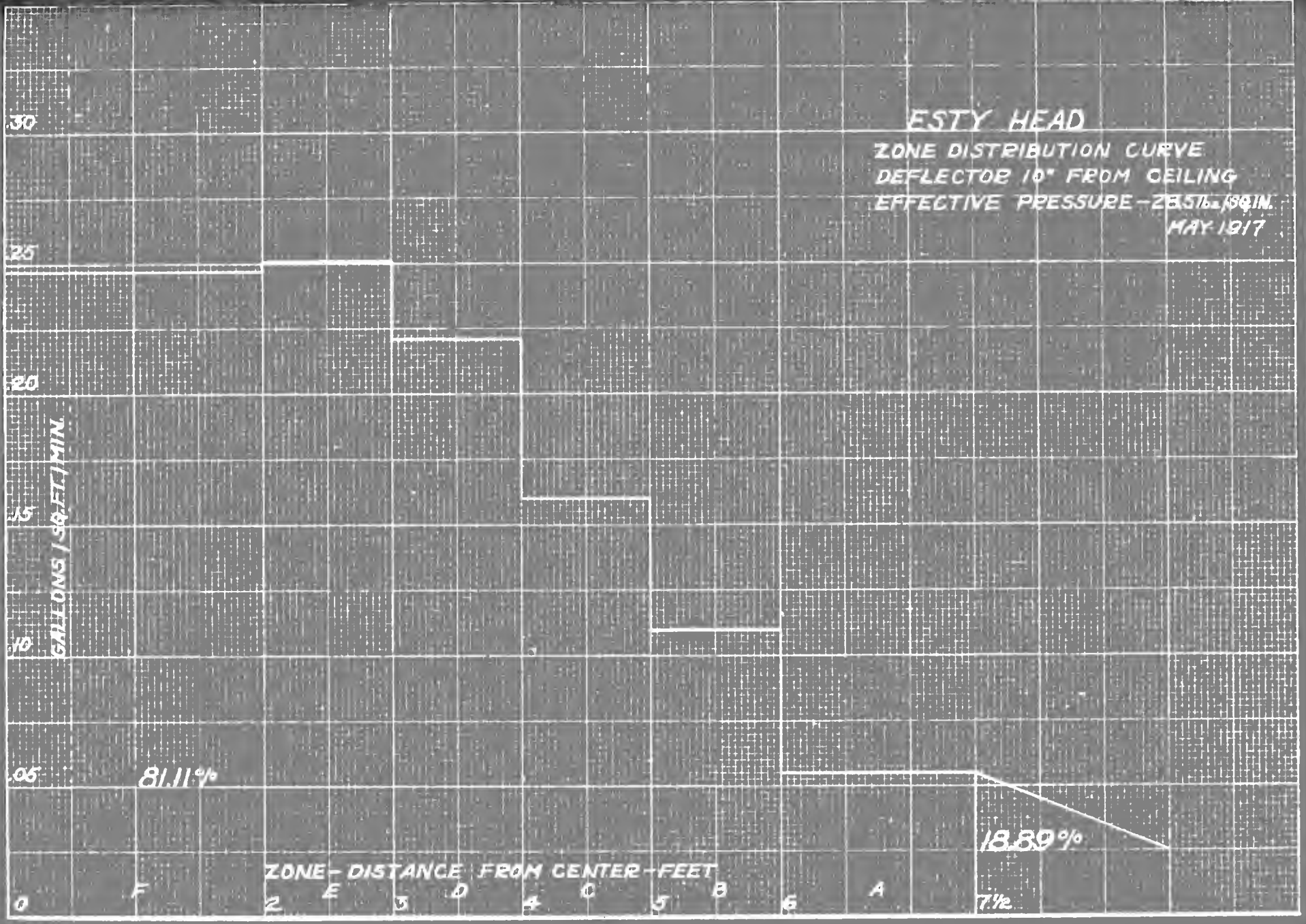
ESTY HEAD

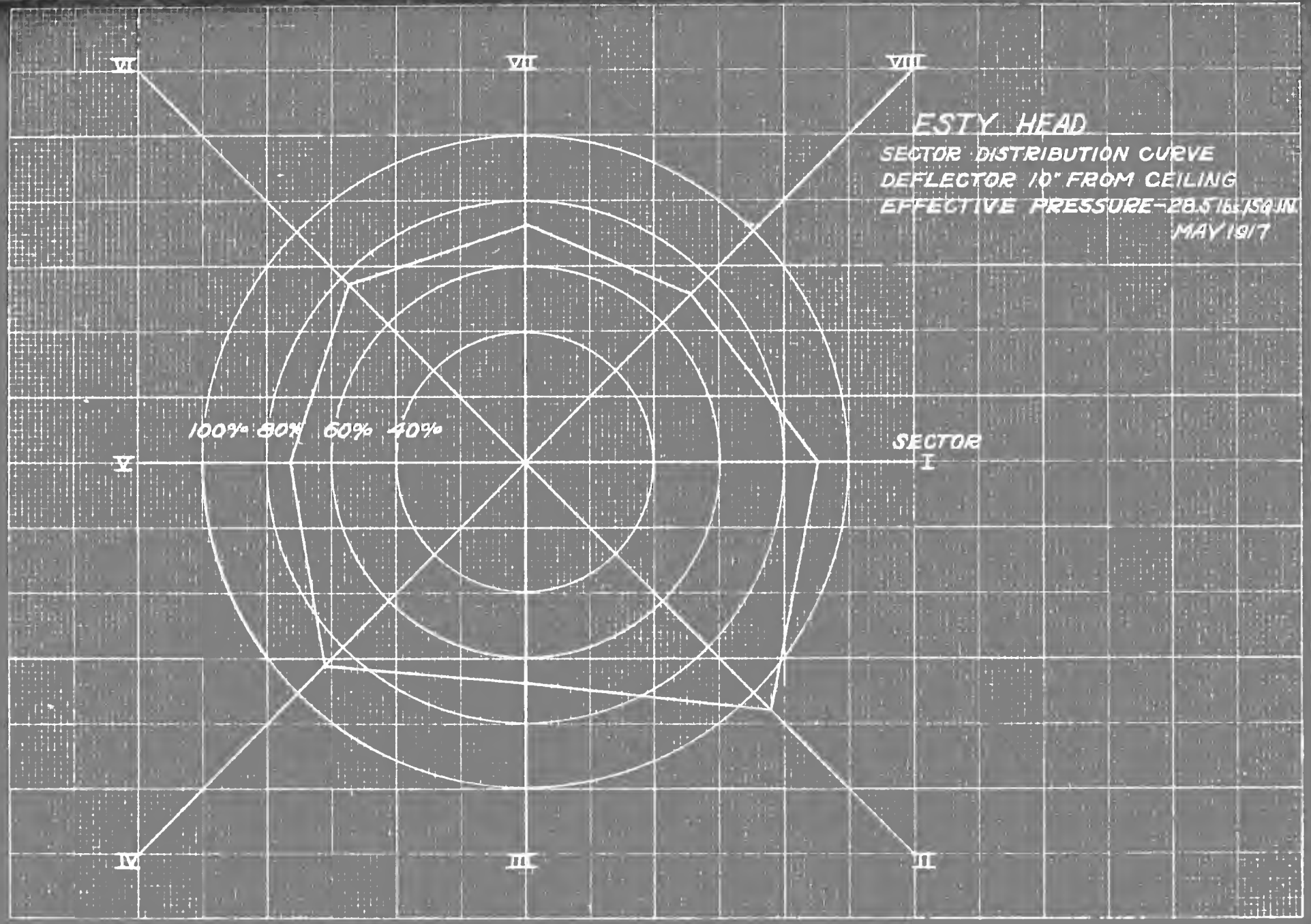
SECTOR DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE-5 lbs/SQ.IN.
MAY 1917

E S T Y H E A D

GAUGE PRESSURE, 25 lbs. sq. in; DEFLECTOR 10" FROM CEILING; EFFECTIVE PRESSURE, 28.5 lbs. sq. in.
5 min. runs.

	S E C T O R S												
PANS	I	II	III	IV	V	VI	VII	VIII	Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
1	5.50	4.75	4.50	7.25	3.00	4.00	5.25	3.75	38.00				
2	5.50	7.25	4.25	6.25	2.75	5.50	3.25	3.25	38.00				
3	6.25	8.75	3.50	5.25	3.75	4.25	2.25	3.75	37.75	A-145.75	17.5	.055	11.97
4	8.25	4.75	4.25	4.00	2.00	2.25	2.75	3.75	32.00				
5	11.60	14.60	7.35	14.10	5.35	9.60	7.60	10.60	80.80				
6	13.25	16.00	8.75	11.50	4.25	7.25	5.00	10.75	76.75	B-157.55	18.9	.109	12.94
7	16.50	19.25	7.50	11.75	8.50	15.00	9.00	11.50	99.00				
8	15.70	19.20	12.20	9.45	5.20	10.20	7.70	10.20	89.85	C-188.85	22.65	.16	15.50
9	17.15	16.90	6.90	14.90	13.40	15.40	12.40	16.90	113.95				
10	12.50	15.50	14.70	9.25	7.25	11.25	11.75	7.50	89.70	D-203.65	24.3	.221	16.60
11	18.75	26.00	17.50	21.00	19.00	20.50	27.50	14.00	164.25	E-164.25	19.7	.251	13.47
12	8.00	11.00	11.25	20.50	36.50	12.25	16.50	13.50	129.50	F-129.50	15.54	.2475	10.63
Total Pounds	138.95	163.95	102.65	135.20	110.95	117.45	110.95	110.95					81.11
Total Gallons	16.68	19.68	12.3	16.23	13.3	14.1	13.3	13.3					
QSector	3.656	3.656	3.656	3.656	3.656	3.656	3.656	3.656	29.25 Gals.				
% in Sector	90.8	107.7	67.3	88.8	72.8	77.	72.8	72.8					


ESTY HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE – 28.5 LBS. SQ. IN.
MAY 1917
GALLONS / SQ. FT. / MIN.
30
25
20
15
10
.05
81.11%
18.89%
ZONE – DISTANCE FROM CENTER – FEET
0
F
2
E
3
D
4
C
5
B
6
A
7½



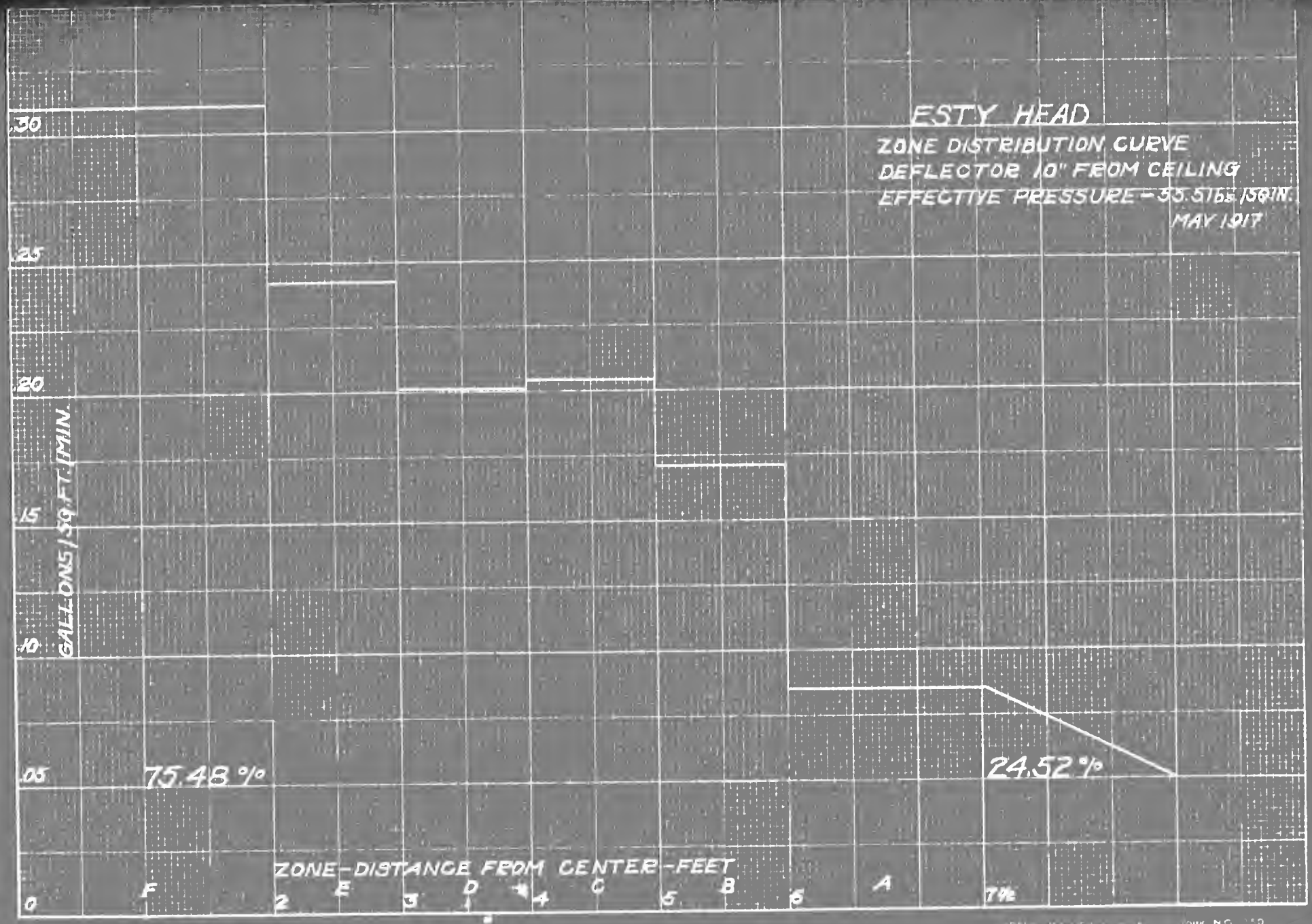
ESTY HEAD

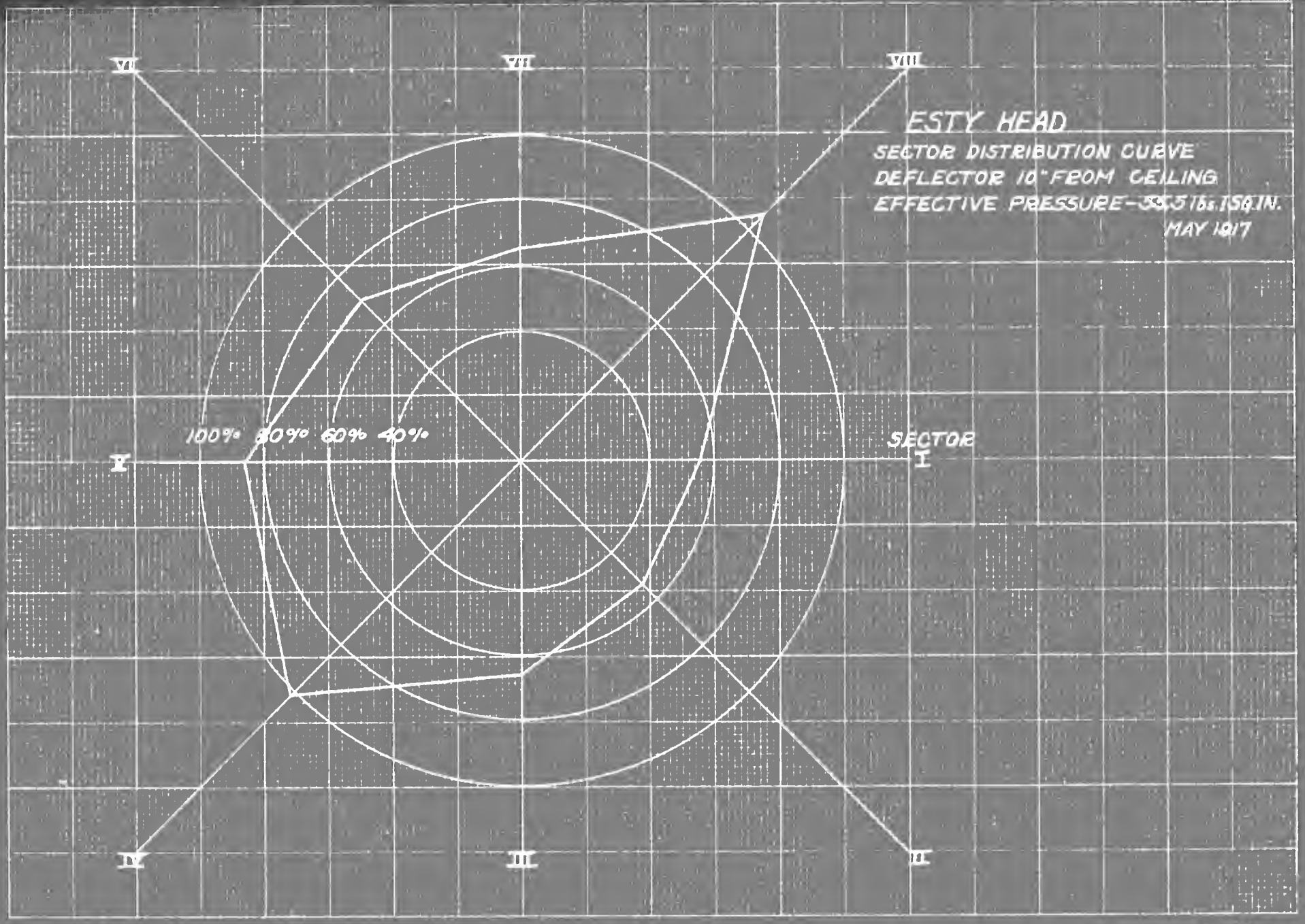
SECTOR DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE-28.5 lbs/SQ IN.
MAY 1917

E S T Y H E A D

GAUGE PRESSURE, 50 lbs. sq. in; DEFLECTOR 10" FROM CEILING; EFFECTIVE PRESSURE, 55.5 lbs. sq. in.
5 min. runs.

PANS	SECTORS I	II	III	IV	V	VI	VII	VIII	Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
1	1.0	0.5	14.0	13.0	4.25	2.00	7.50	12.00	54.25				
2	1.75	1.75	1.75	15.75	7.25	3.75	1.75	12.75	46.50	A-224.75	26.97	.0848	13.32
3	6.25	3.75	0.25	17.75	11.75	7.75	1.25	12.25	61.00				
4	12.25	1.75	0.25	17.25	10.75	5.25	2.25	13.25	63.00				
5	2.60	2.60	15.6	24.60	16.10	7.60	16.10	21.60	106.8	B-246.8	29.62	.1714	14.62
6	25.25	6.25	2.25	30.25	26.25	18.75	5.25	25.75	140.0				
7	6.00	8.00	26.50	28.00	16.75	11.50	15.50	26.50	138.75	C-280.35	33.64	.2380	16.61
8	16.70	21.20	7.20	16.20	20.20	32.20	7.70	20.20	141.6				
9	7.90	11.90	12.90	12.40	14.40	10.40	18.40	19.40	107.7	D-197.2	23.66	.2152	11.68
10	8.25	14.25	7.25	10.25	11.75	13.25	6.75	17.75	89.5				
11	14.50	17.50	24.00	13.50	15.00	17.50	26.00	30.50	158.5	E-158.5	19.02	.2422	9.39
12	15.00	22.00	26.00	16.00	24.25	18.00	30.00	15.00	166.25	F-166.25	19.95	.3176	9.86
Total Pounds	117.45	111.45	137.95	214.95	178.70	147.95	138.45	226.95					75.48
Total Gallons	14.09	13.37	16.55	25.79	21.46	17.75	16.61	27.25					
QSector	5.0625	5.0625	5.0625	5.0625	5.0625	5.0625	5.0625	5.0625	40.5 Gals.				
% in Sector	55.7	52.8	65.3	101.8	84.7	70.2	65.7	107.7					

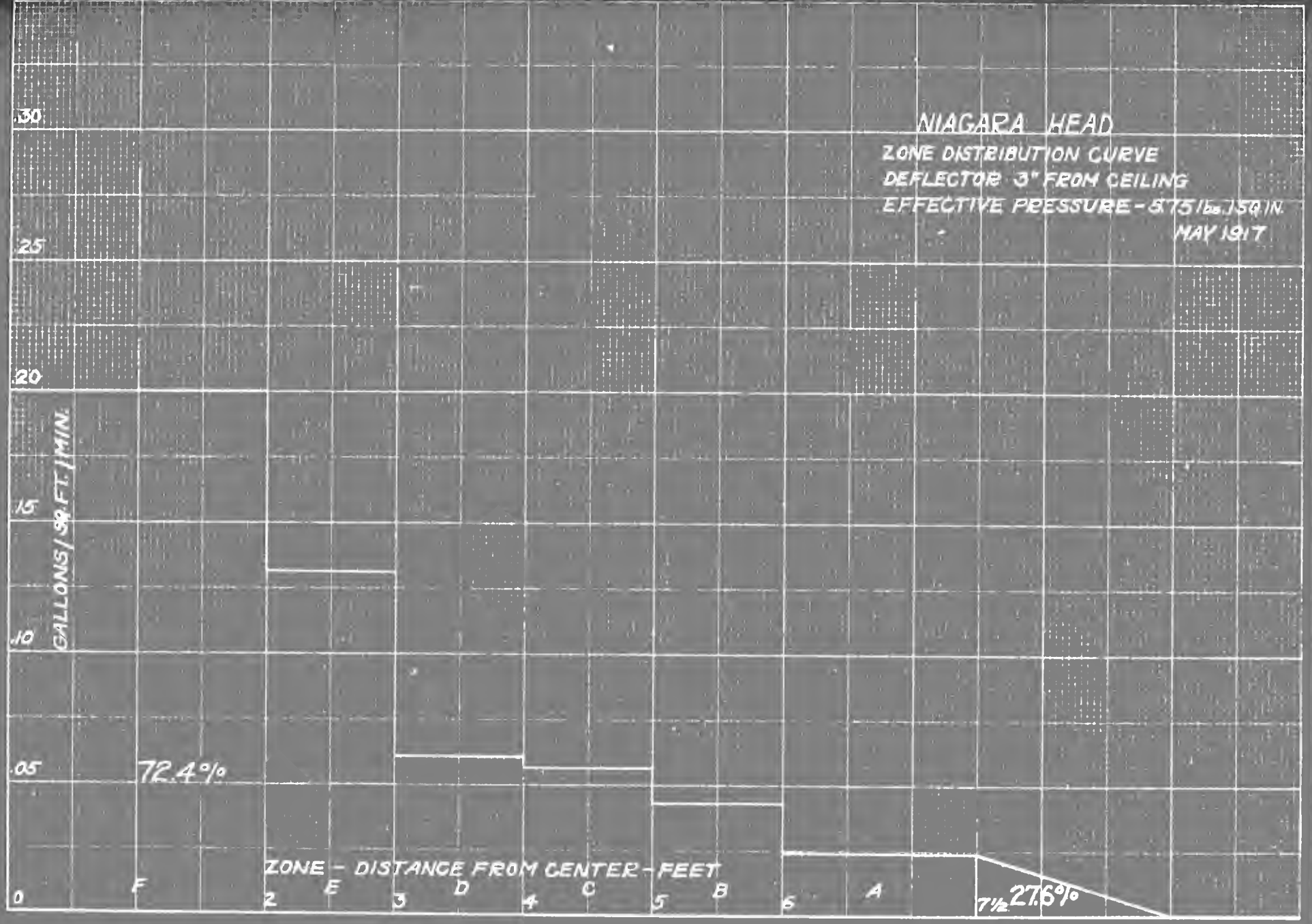

ESTY HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE = 55.5 lbs /SQ IN.
MAY 1917
30
25
20
15
10
05
GALLONS / SQ. FT. / MIN.
75.48 %
24.52 %
ZONE - DISTANCE FROM CENTER - FEET
0
F
2
E
3
D
1
4
C
5
B
6
A
7½

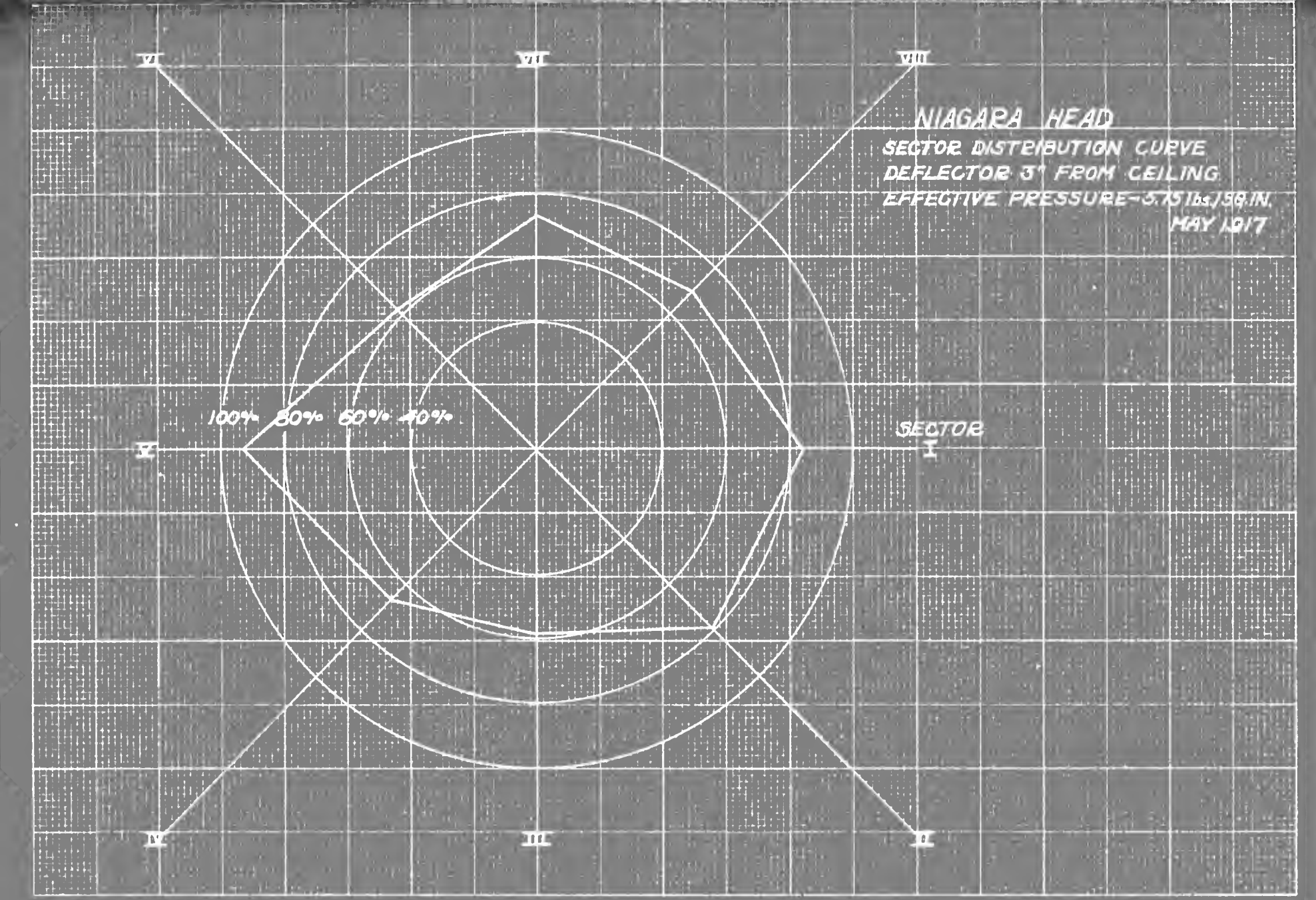

VII
VII
VIII
ESTY HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE-
MAY 1917
100% 80% 60% 40%
SECTOR
I
I
IV
II
III

N I A G A R A H E A D

GAUGE PRESSURE, 5 lbs. sq. in; DEFLECTOR 3" FROM CEILING; EFFECTIVE PRESSURE, 5.75 lbs. sq. in.
5 min. runs.

	S E C T O R S												
PANS	I	II	III	IV	V	VI	VII	VIII	Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
1	2.00	3.5	2.5	1.00	3.00	3.50	3.00	1.50	20.00				
2	.75	1.25	.75	.75	1.25	.75	1.75	.75	8.00	A- 62.50	7.5	.0236	10.15
3	3.75	.75	.75	.75	3.25	.75	1.75	.75	12.50				
4	3.75	2.75	2.25	2.75	1.25	3.75	3.75	1.75	22.00				
5	2.10	4.10	2.10	2.85	4.10	4.10	3.60	5.60	28.55				
6	12.25	2.75	2.25	2.75	4.25	4.25	3.75	2.75	35.00	B- 63.55	7.63	.0431	10.32
7	2.50	4.50	2.50	6.00	4.50	3.50	4.00	6.50	34.00				
8	13.70	2.70	3.20	2.20	4.70	3.70	3.20	2.70	36.10	C- 70.10	8.41	.0595	11.41
9	3.40	6.90	3.15	2.90	3.40	2.90	4.90	2.90	30.45				
10	3.25	4.25	2.75	3.75	2.75	2.75	3.25	3.25	26.00	D- 56.45	6.77	.0615	9.22
11	7.75	19.50	12.50	7.00	9.00	7.75	12.50	10.00	86.00	E- 86.00	10.32	.1315	14.0
12	9.00	6.50	9.50	17.50	30.00	9.25	10.50	14.00	106.25	F-106.25	12.75	.2035	17.3
Total Pounds	64.20	59.45	44.20	50.20	71.45	46.95	55.95	52.45					72.40
Total Gallons	7.7	7.13	5.3	6.02	8.57	5.63	6.71	6.29					
QSector	1.84375	1.84375	1.84375	1.84375	1.84375	1.84375	1.84375	1.84375	14.75 Gals.				
% in Sector	83.7	77.5	57.6	65.1	93.0	61.25	73.	68.4					

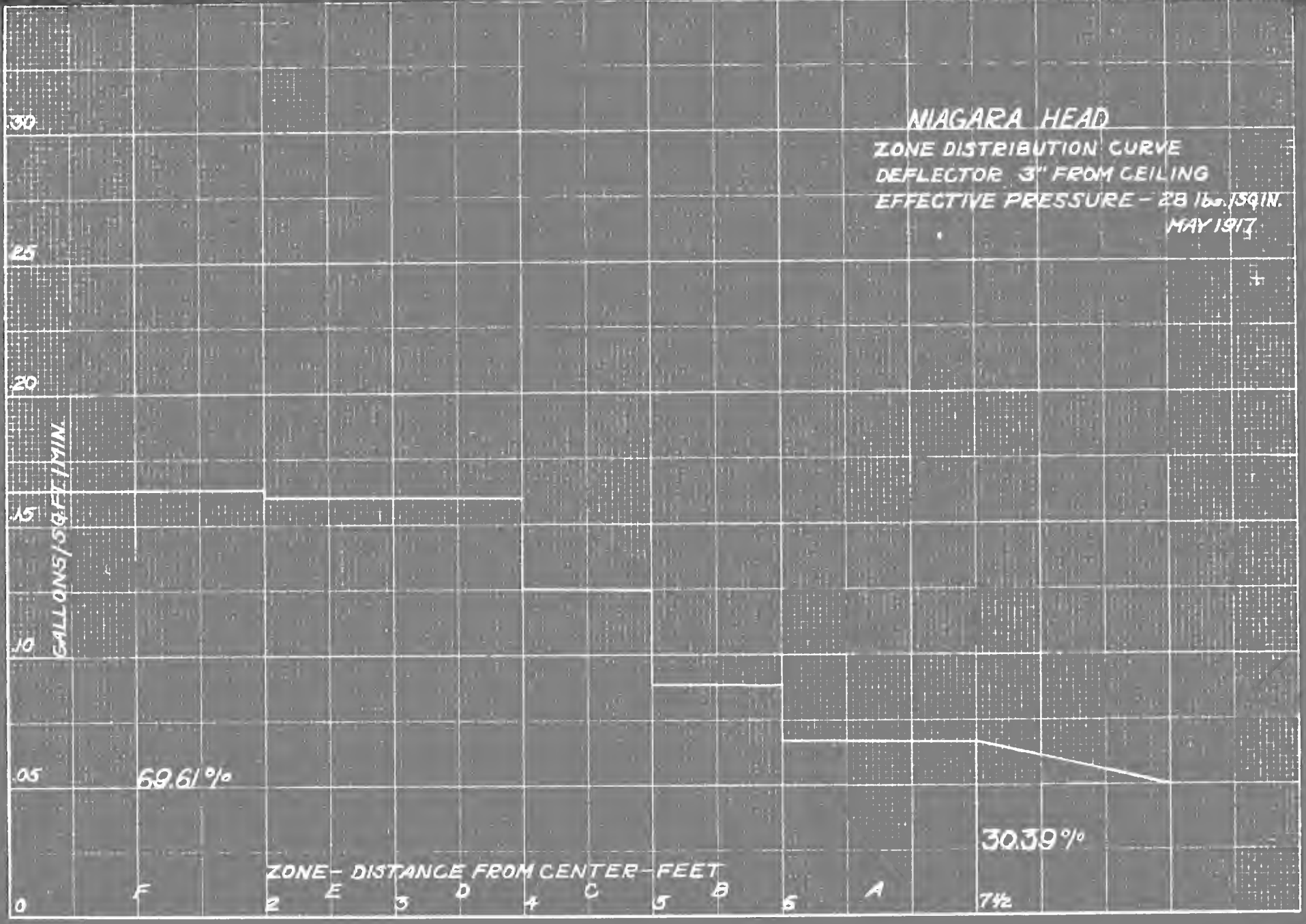

NIAGARA HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE - .575 lbs. .150 IN.
MAY 1917
GALLONS / SQ. FT. / MIN.
.30
.25
.20
.15
.10
.05
72.4%
ZONE - DISTANCE FROM CENTER - FEET
0
F
2
E
3
D
4
C
5
B
6
A
7½
27.6%

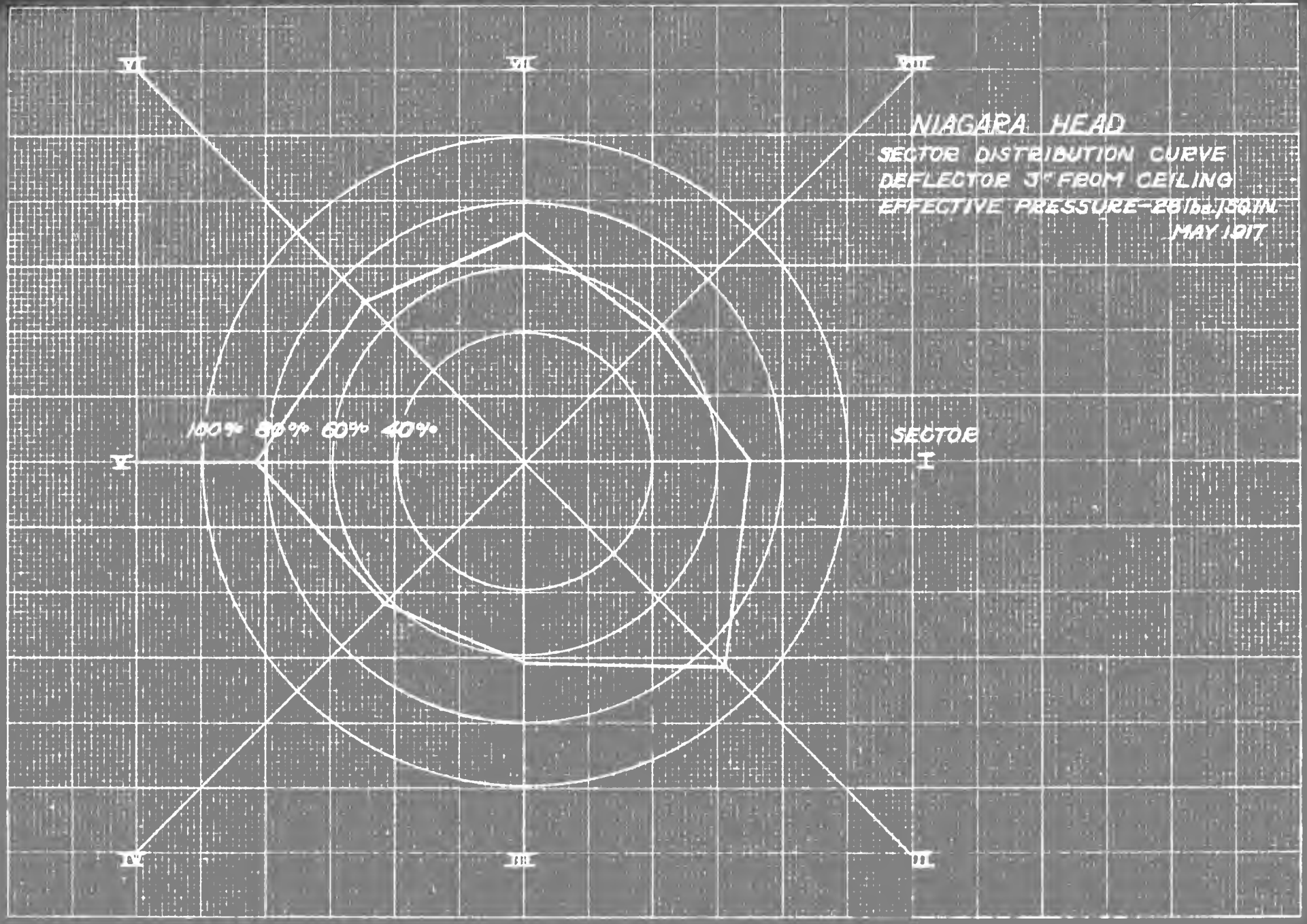

VI
VII
VIII
NIAGARA HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE-5.75 lbs./SQ.IN.
MAY 1917
100% 80% 60% 40%
SECTOR
V
I
IV
III
II

N I A G A R A H E A D

GAUGE PRESSURE, 25 lbs. sq. in; DEFLECTOR 3" FROM CEILING; EFFECTIVE PRESSURE, 28.0 lbs. sq. in.
5 min. runs.

	S E C T O R S								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	7.00	5.50	7.50	6.00	8.00	8.50	6.00	12.00	60.50				
2	2.75	7.75	2.75	3.75	3.25	2.75	5.25	3.75	32.00				
3	7.25	5.75	1.75	1.75	5.75	2.25	3.75	1.75	30.00	A-177.00	21.25	.067	14.7
4	17.75	9.75	2.75	4.25	1.75	7.25	8.25	2.75	54.50				
5	7.10	11.10	9.10	6.10	9.10	8.60	10.10	7.60	68.80				
6	10.25	11.75	3.75	6.75	4.25	8.75	9.75	3.25	58.50	B-127.30	15.3	.0887	10.55
7	7.00	18.00	12.00	5.00	13.00	11.00	16.00	4.50	86.50				
8	5.70	11.20	6.20	7.70	3.70	11.70	9.20	4.70	60.10	C-146.60	17.6	.1245	12.15
9	9.40	14.40	8.90	3.40	11.40	10.40	7.90	3.90	69.70				
10	5.25	12.25	10.75	8.75	3.75	11.25	11.75	12.75	76.50	D-146.20	17.55	.160	12.10
11	20.50	18.00	21.00	24.50	20.50	17.00	15.00	21.00	157.50	E-157.50	18.9	.241	13.05
12	5.00	5.00	5.50	16.00	39.50	4.50	2.50	7.50	85.50	F- 85.5	10.25	.1635	7.06
Total Pounds	104.95	130.45	91.95	93.95	123.95	103.95	105.45	85.45					69.61
Total Gallons	12.6	15.65	11.03	11.27	14.87	12.47	12.65	10.25					
% in Sector	70.0	86.8	61.0	61.5	82.5	69.2	70.25	56.8					
QSector	3.625	3.625	3.625	3.625	3.625	3.625	3.625	3.625	29.0 Gals.				


NIAGARA HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE – 28 lbs. /SQ IN.
MAY 1917
30
25
20
15
10
05
0
GALLONS/SQ FT/MIN.
69.61 %
30.39 %
ZONE – DISTANCE FROM CENTER – FEET
F
2
E
3
D
4
C
5
B
6
A
7½



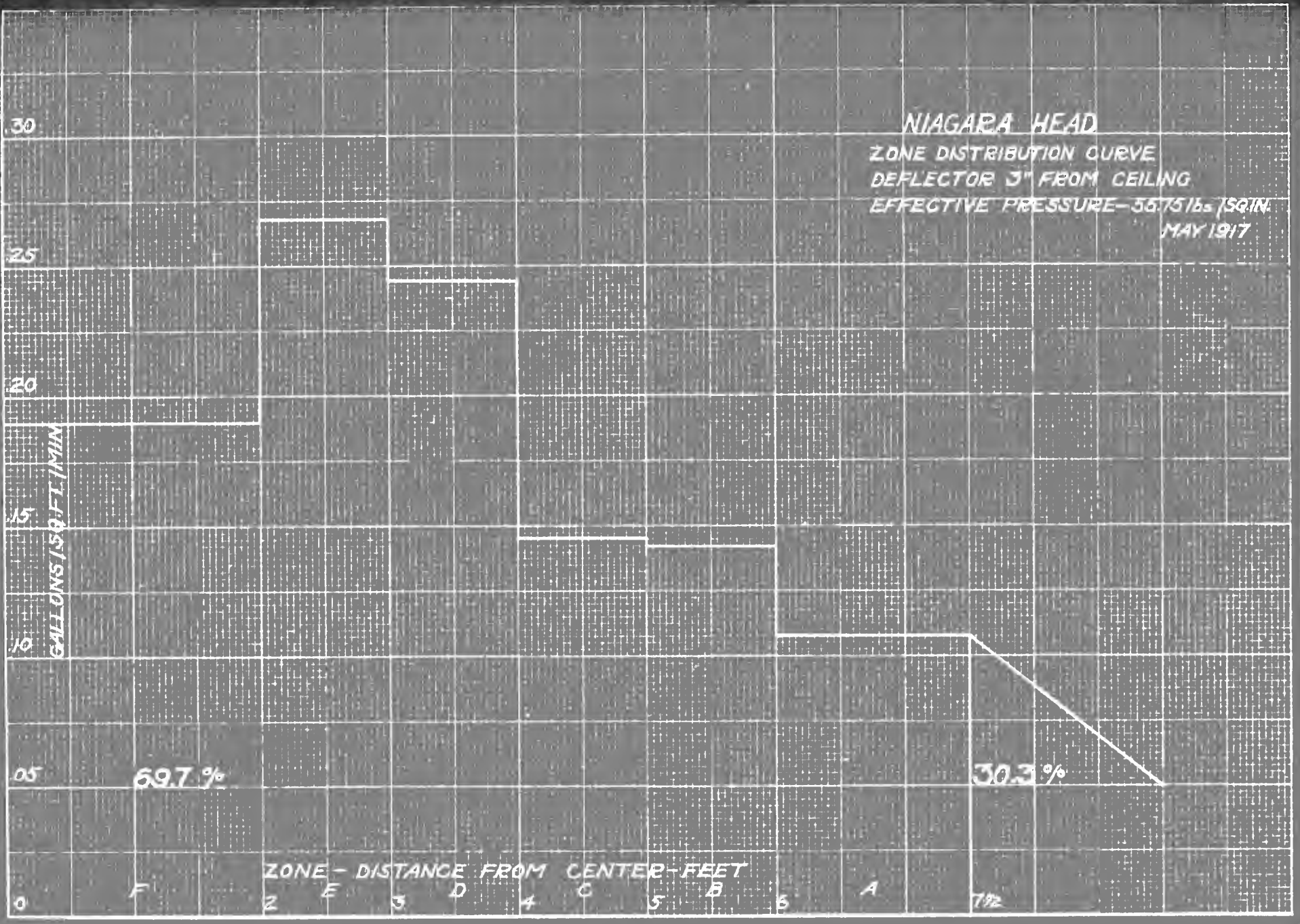
NIAGARA HEAD

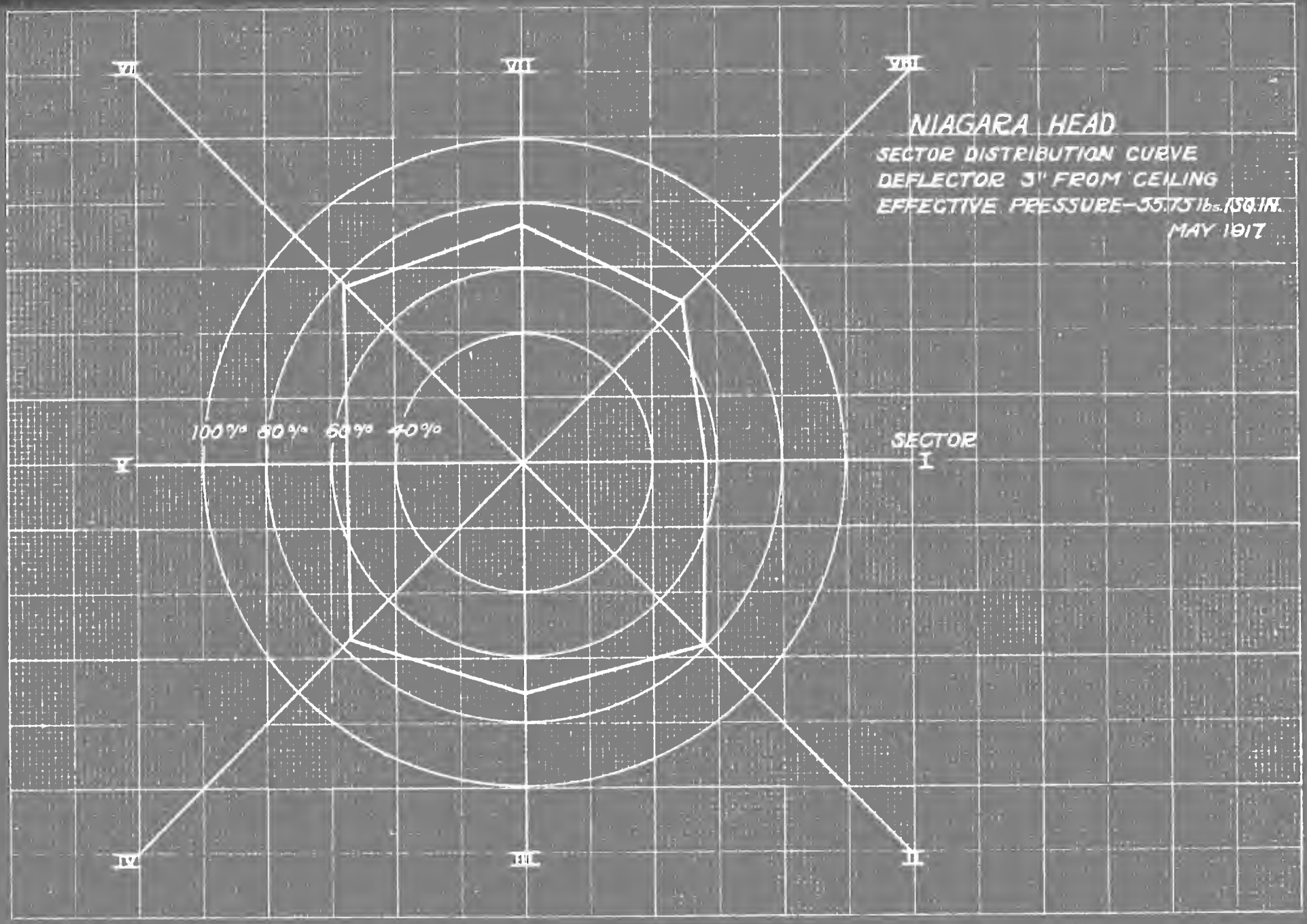
SECTOR DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE-.28 lbs./SQ.IN.
MAY 1917

N I A G A R A H E A D

GAUGE PRESSURE, 50 lbs. sq. in; DEFLECTOR 3" FROM CEILING; EFFECTIVE PRESSURE, 55.75 lbs. sq. in.
5 min. runs.

	S E C T O R S								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	10.5	11.5	16.5	16.0	9.0	15.5	9.5	17.5	106.0				
2	2.75	11.25	3.25	7.25	3.25	4.75	10.25	11.75	54.50				
3	5.25	6.75	2.25	3.75	2.75	4.75	4.75	4.75	35.00	A-286.0	34.4	.108	17.2
4	15.25	13.25	7.25	12.75	5.75	14.75	12.25	9.25	90.50				
5	8.6	21.6	20.6	13.1	13.1	16.1	18.6	14.1	125.8				
6	9.75	12.25	6.25	10.0	4.25	14.25	11.25	9.0	77.00	B-202.8	24.6	.1425	12.3
7	10.5	18.5	6.5	6.5	9.0	13.0	11.0	4.5	79.5				
8	7.2	13.7	9.7	11.7	3.7	17.7	13.2	15.7	92.6	C-172.1	20.7	.146	10.35
9	12.9	16.4	12.9	10.9	11.4	14.9	5.9	6.9	92.2				
10	7.75	20.25	21.75	19.75	4.75	18.75	18.25	19.25	130.50	D-222.7	26.8	.244	13.4
11	21.5	11.0	27.5	28.5	20.5	18.0	24.0	24.0	175.0	E-175.0	21.0	.268	10.5
12	6.0	7.0	11.0	19.0	26.5	11.0	9.5	9.5	99.5	F- 99.5	11.9	.19	5.95
Total Pounds	117.95	163.45	145.45	159.20	113.95	163.45	148.45	146.20					69.70
Total Gallons	14.15	19.6	17.5	19.2	13.7	19.6	17.8	17.5					
QSector	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	40.0 Gals.				
% in Sector	56.6	78.4	70.0	76.8	54.8	78.4	72.2	70.0					

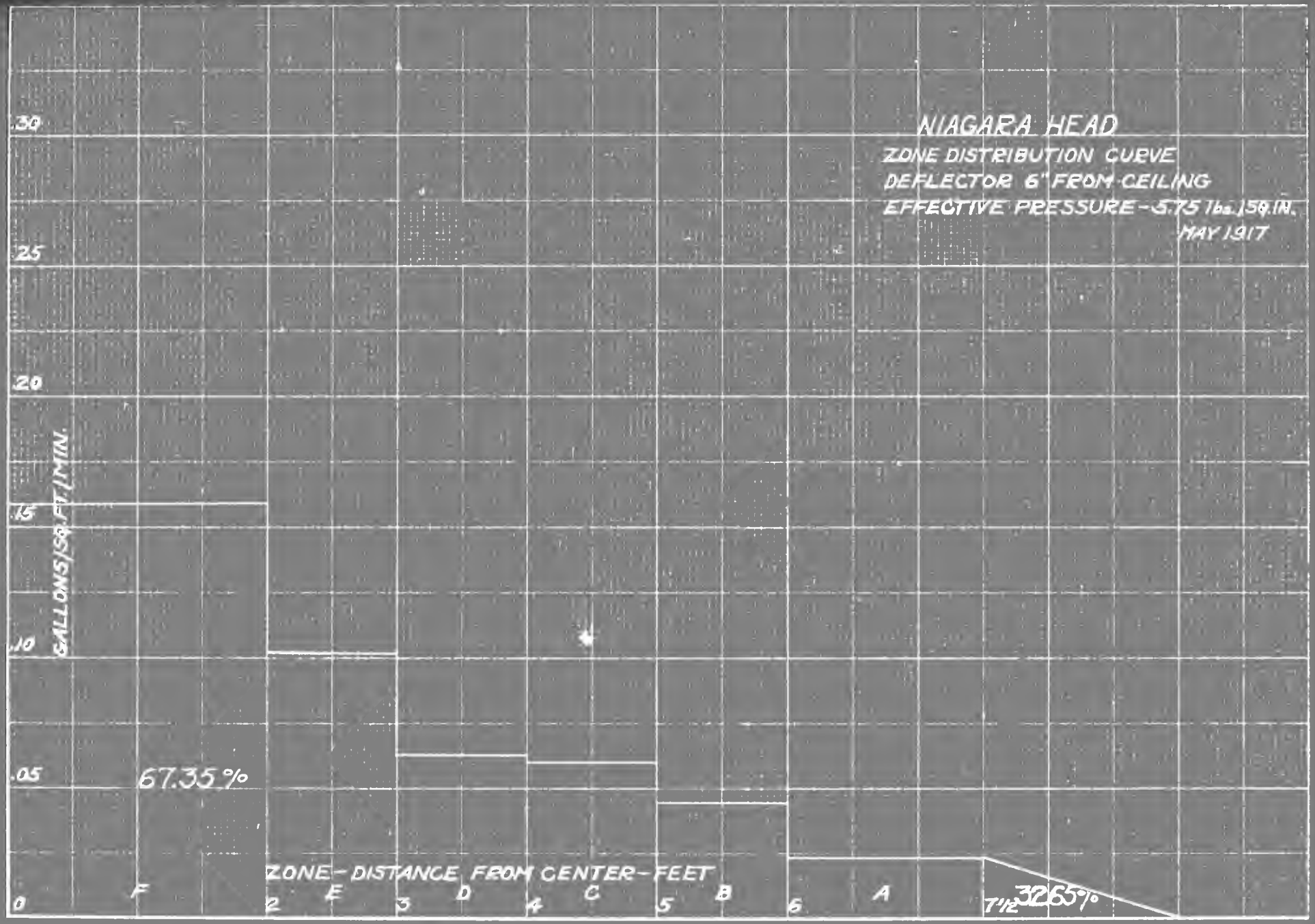


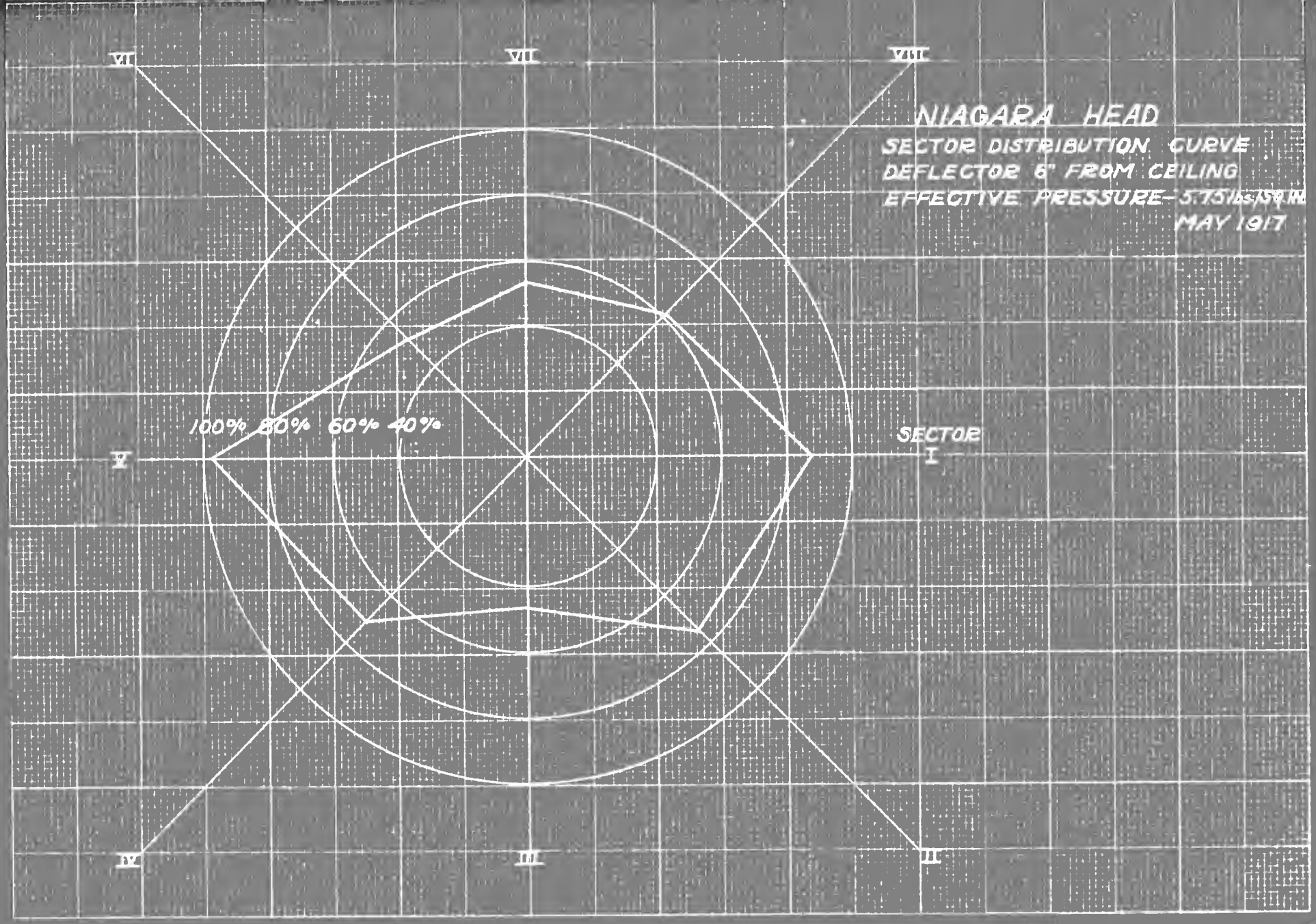

VII
VIII
VIII
NIAGARA HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE-55.75 lbs./SQ.IN.
MAY 1917
100% 80% 60% 40%
SECTOR
I
V
IV
III
II

N I A G A R A H E A D

GAUGE PRESSURE, 5 lbs. sq. in; DEFLECTOR 6" FROM CEILING; EFFECTIVE PRESSURE, 5.75 lbs. sq. in.
5 min. runs.

	S E C T O R S								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	1.50	3.50	2.00	1.50	2.50	2.50	2.10	1.00	16.60				
2	2.00	1.25	1.25	0.75	1.75	0.75	1.25	0.75	9.75				
3	5.25	1.75	1.25	1.75	4.00	1.25	2.10	1.25	18.60	A--63.45	7.62	.0239	10.5
4	2.25	2.75	2.75	3.00	1.25	1.75	2.00	2.75	18.50				
5	2.60	3.60	2.10	3.60	2.60	3.10	2.60	4.10	24.30				
6	14.25	3.75	2.75	2.25	4.75	4.25	4.60	2.75	39.35	B--63.65	7.63	.0441	10.5
7	3.00	4.50	2.50	6.50	4.50	3.50	2.50	4.50	31.50				
8	15.20	4.20	3.20	2.20	4.70	4.20	3.50	2.70	39.90	C--71.40	8.57	.0605	11.85
9	2.40	5.90	2.40	3.15	9.00	2.40	3.10	2.40	30.75				
10	3.25	5.75	2.25	3.75	2.75	2.75	2.25	4.75	27.50	D--58.25	6.99	.0635	9.65
11	6.00	14.00	6.50	6.50	8.00	6.00	8.25	11.50	66.75	E--66.75	8.01	.102	11.05
12	8.00	5.00	5.50	17.50	27.50	6.00	6.25	7.50	83.25	F--83.25	10.	.159	13.8
Total Pounds	65.70	55.95	34.45	52.45	73.30	38.45	40.50	45.95					67.35
Total Gallons	7.88	6.72	4.13	6.29	8.80	4.62	4.86	5.52					
QSector	1.8125	1.8125	1.8125	1.8125	1.8125	1.8125	1.8125	1.8125	14.5 Gals.				
% in Sector	87.0	74.2	45.5	69.5	97.0	50.8	53.7	61.0					

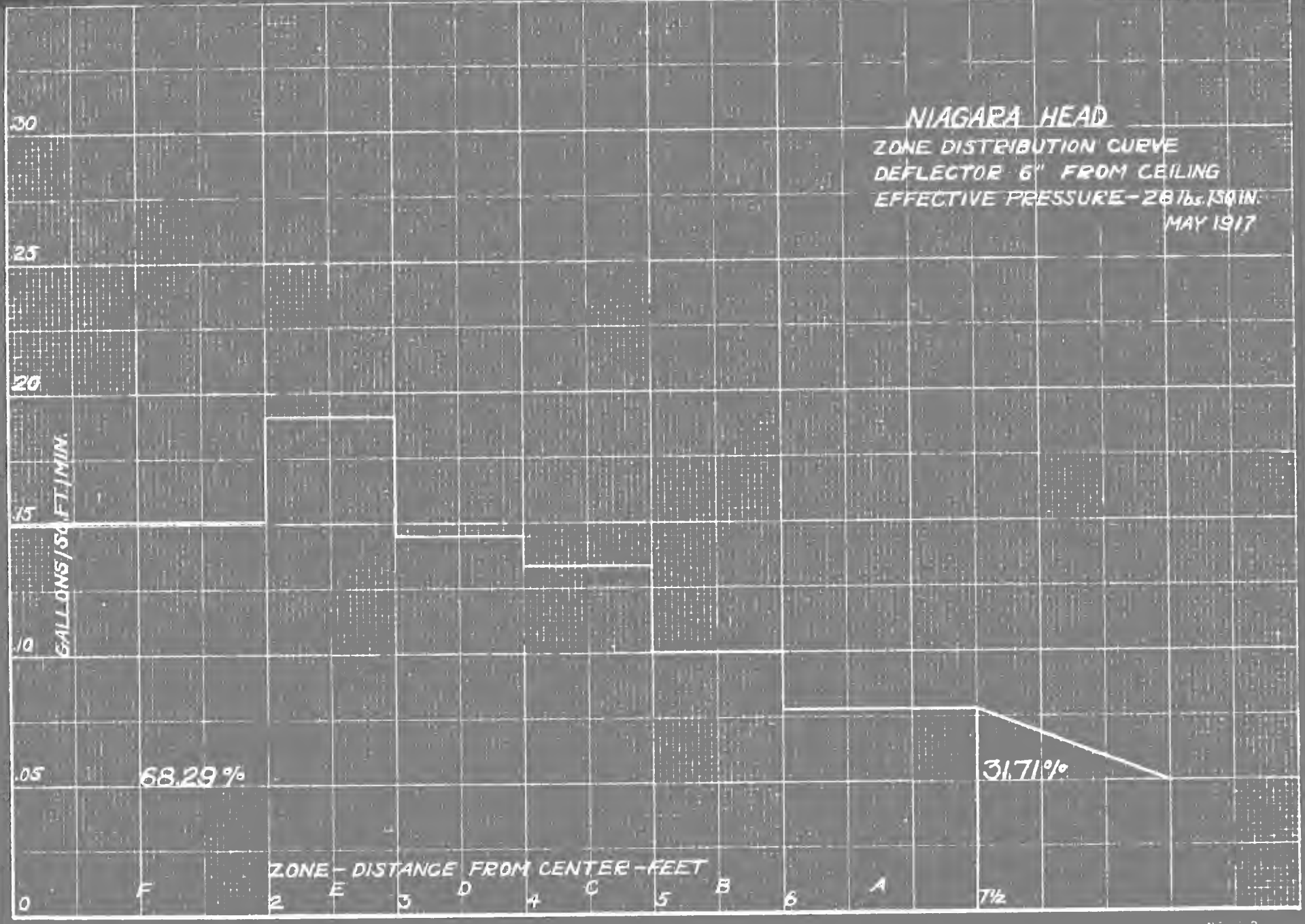

NIAGARA HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE - 5.75 lbs. / SQ. IN.
MAY 1917
.30
.25
.20
.15
.10
.05
0
GALLONS / SQ. FT. / MIN.
67.35%
32.65%
7½
ZONE - DISTANCE FROM CENTER - FEET
F
2
E
3
D
4
C
5
B
6
A

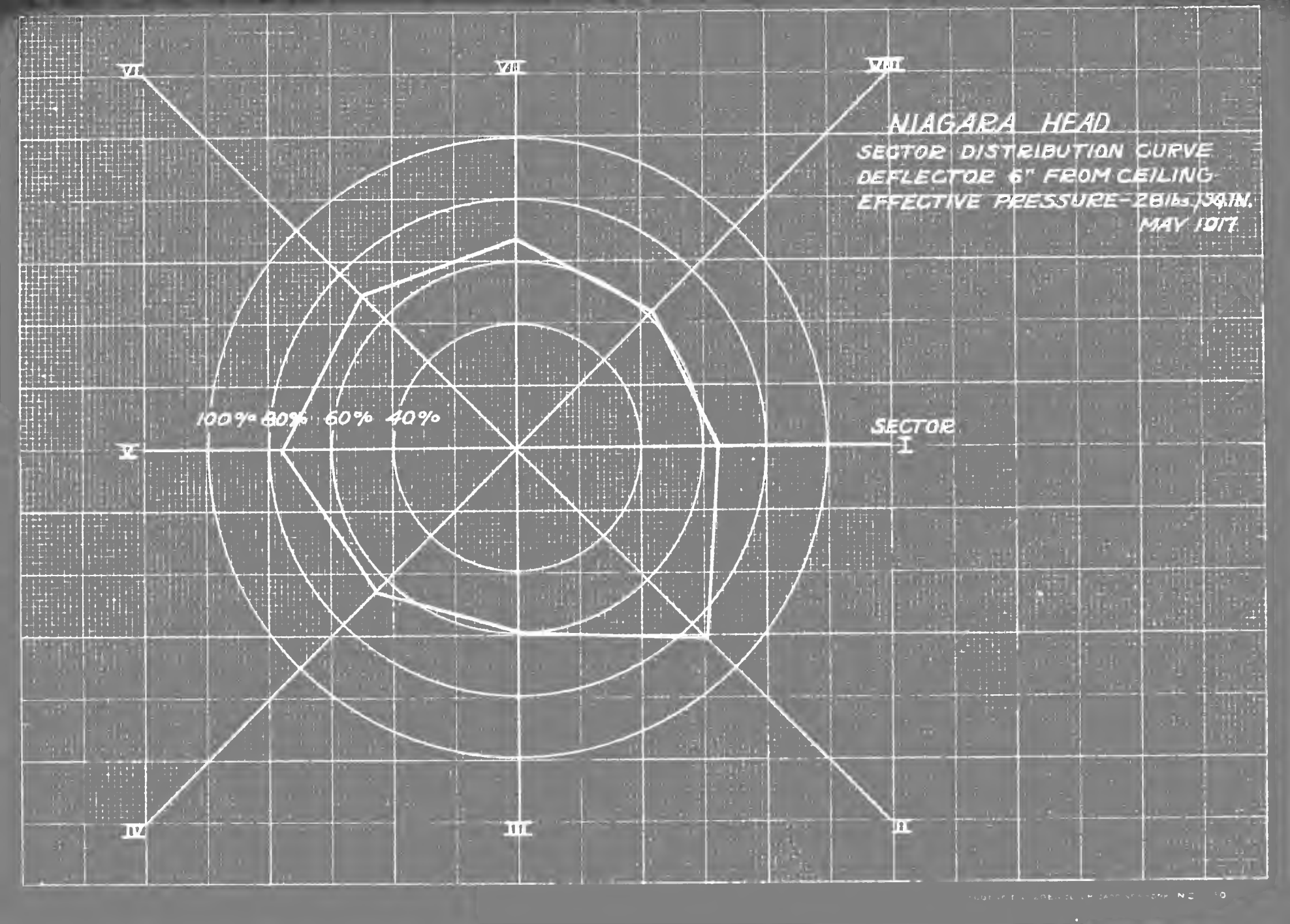

VI
VII
VIII
NIAGARA HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE- 5.75 lbs/SQ IN
MAY 1917
100% 80% 60% 40%
SECTOR
I
V
IV
III
II

N I A G A R A H E A D

GAUGE PRESSURE, 25 lbs. sq. in; DEFLECTOR 6" FROM CEILING; EFFECTIVE PRESSURE, 28.0 lbs. sq. in.
5 min. runs.

	S E C T O R S								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	8.00	4.25	7.00	13.50	10.50	9.00	6.50	17.50	76.25				
2	2.75	8.75	4.75	5.75	3.75	7.25	6.25	6.25	45.50				
3	5.25	7.25	1.75	1.25	2.75	2.75	3.25	2.25	26.50	A-187.25	22.47	.078	15.50
4	15.25	7.75	1.75	1.75	1.25	4.75	4.25	2.25	39.00				
5	9.60	12.10	12.60	11.10	12.60	12.10	12.10	10.60	92.80				
6	9.25	13.75	3.75	3.25	3.25	7.75	6.25	3.75	51.00	B-143.80	17.26	.100	11.90
7	8.00	17.50	15.00	7.50	18.00	13.00	17.00	6.00	102.00				
8	5.70	12.70	7.70	5.20	3.70	9.20	7.70	3.70	55.60	C-157.60	18.90	.1335	13.03
9	8.40	12.40	5.90	4.90	11.40	8.90	9.40	4.40	65.70				
10	5.75	13.25	7.25	9.25	3.75	10.75	6.75	10.25	67.00	D-132.70	15.93	.145	10.98
11	14.00	15.50	15.00	21.50	14.50	13.00	15.00	16.50	125.00	E-125.00	15.00	.191	10.35
12	5.00	5.50	6.00	14.00	27.50	6.50	5.50	9.00	79.00	F- 79.00	9.48	.151	6.53
Total Pounds	96.95	130.70	88.45	98.95	112.95	104.95	99.95	92.45					68.29
Total Gallons	11.63	15.68	10.6	11.88	13.55	12.6	12.00	11.1					
QSector	3.625	3.625	3.625	3.625	3.625	3.625	3.625	3.625	29.0 Gals.				
% in Sector	64.2	86.5	58.5	65.5	74.7	69.5	66.2	61.3					

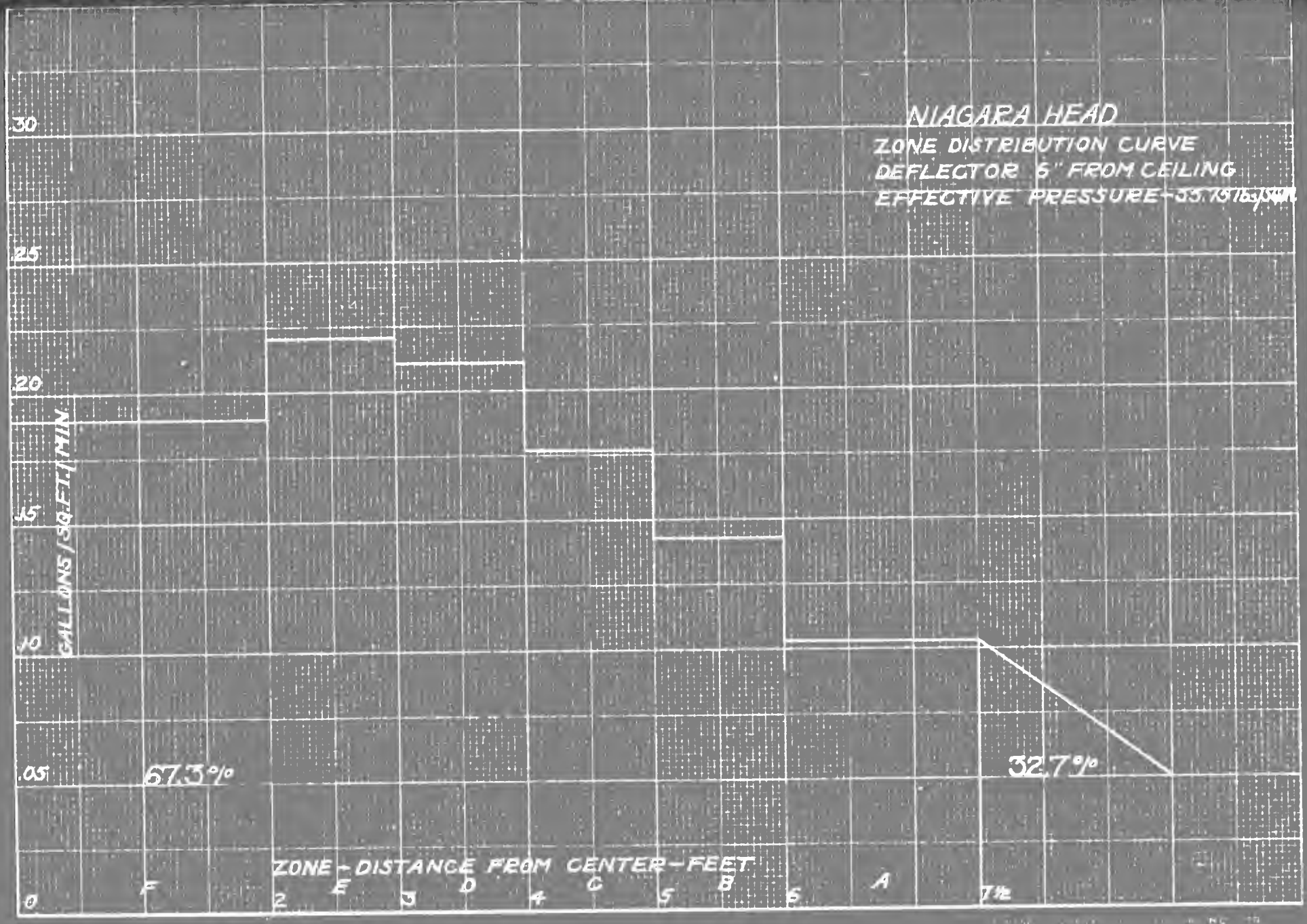

NIAGARA HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE - 28 lbs. IN.
MAY 1917
.30
.25
.20
.15
.10
.05
0
GALLONS/SQ. FT./MIN.
68.29%
31.71%
ZONE - DISTANCE FROM CENTER - FEET
F
E
D
C
B
A
2
3
4
5
6
7½

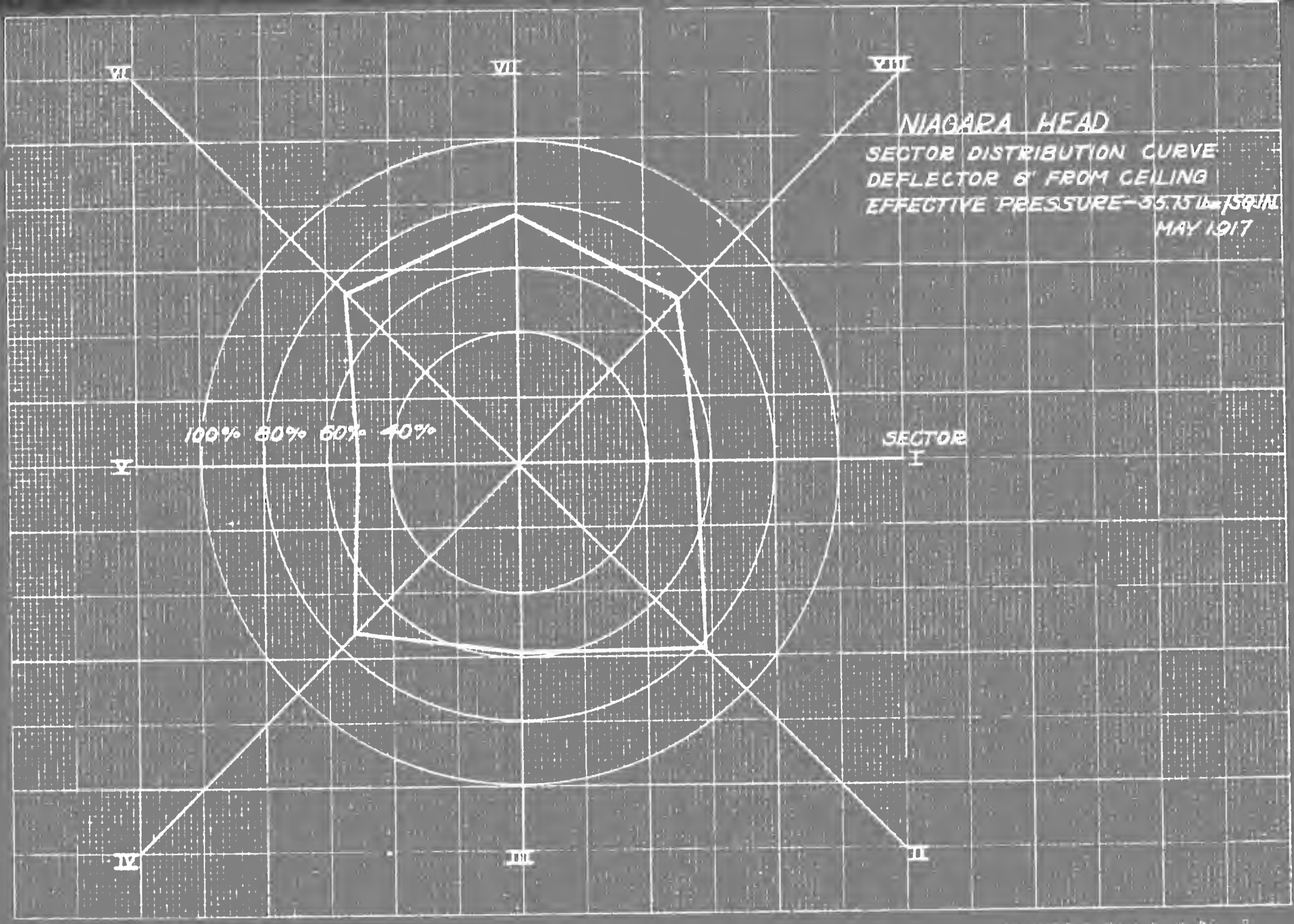

NIAGARA HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE - 28 lbs. /SQ.IN.
MAY 1917
100% 80% 60% 40%
SECTOR I
VI
VII
VIII
V
IV
III
II

N I A G A R A H E A D

GAUGE PRESSURE, 50 lbs. sq. in; DEFLECTOR 6" FROM CEILING; EFFECTIVE PRESSURE, 55.75 lbs. sq. in.
5 min. runs.

	S E C T O R S								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	8.5	12.5	14.5	15.5	8.5	15.5	16.0	19.5	110.5				
2	2.25	14.25	2.75	7.75	2.25	3.75	10.25	12.25	55.50	A-271.5	32.5	.102	16.25
3	5.75	9.75	1.25	3.25	1.75	6.25	6.25	8.25	42.50				
4	12.75	13.25	3.25	9.25	1.75	13.25	4.25	5.25	63.00				
5	8.6	25.6	14.1	14.1	12.1	16.1	16.6	15.6	122.8	B-205.8	24.7	.143	12.35
6	11.25	12.25	4.75	10.75	3.25	16.75	14.75	9.25	83.00				
7	10.5	23.5	19.0	11.5	11.5	15.0	17.0	9.5	117.5	C-209.6	25.0	.177	12.50
8	8.7	12.2	8.2	13.7	3.2	15.2	15.7	15.2	92.1				
9	11.9	9.9	7.9	13.9	9.9	12.9	8.9	6.9	82.2	D-193.7	23.2	.211	11.60
10	7.75	20.75	13.25	18.75	3.75	16.25	15.75	15.25	111.50				
11	19.0	9.5	20.5	20.5	17.0	16.0	23.5	18.5	144.5	E-144.5	17.3	.221	18.65
12	8.0	8.0	8.5	16.0	28.5	10.5	9.0	11.0	99.5	F- 99.5	11.9	.19	5.95
Total Pounds	114.95	171.45	117.95	154.95	103.45	157.45	157.95	146.45					67.3
Total Gallons	13.8	20.6	14.3	18.6	12.4	18.9	19.0	17.6					
QSector	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	40.0 Gals.				
% in Sector	55.2	82.4	57.2	74.4	49.6	75.6	76.0	78.4					

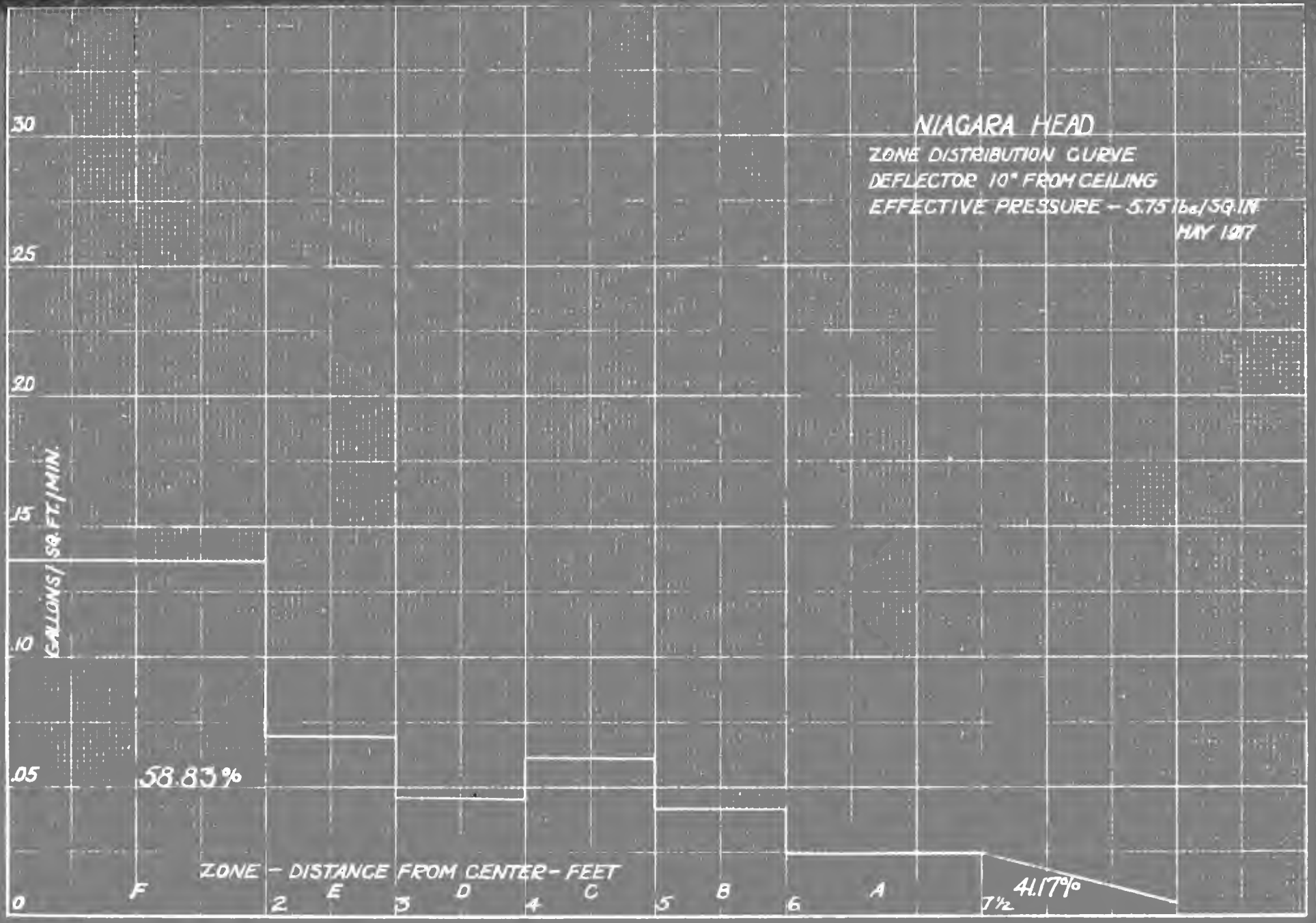

NIAGARA HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE-
GALLONS/SQ.FT./MIN.
30
25
20
15
10
.05
0
67.3%
32.7%
ZONE - DISTANCE FROM CENTER - FEET
F
2
E
3
D
4
C
5
B
6
A
7½

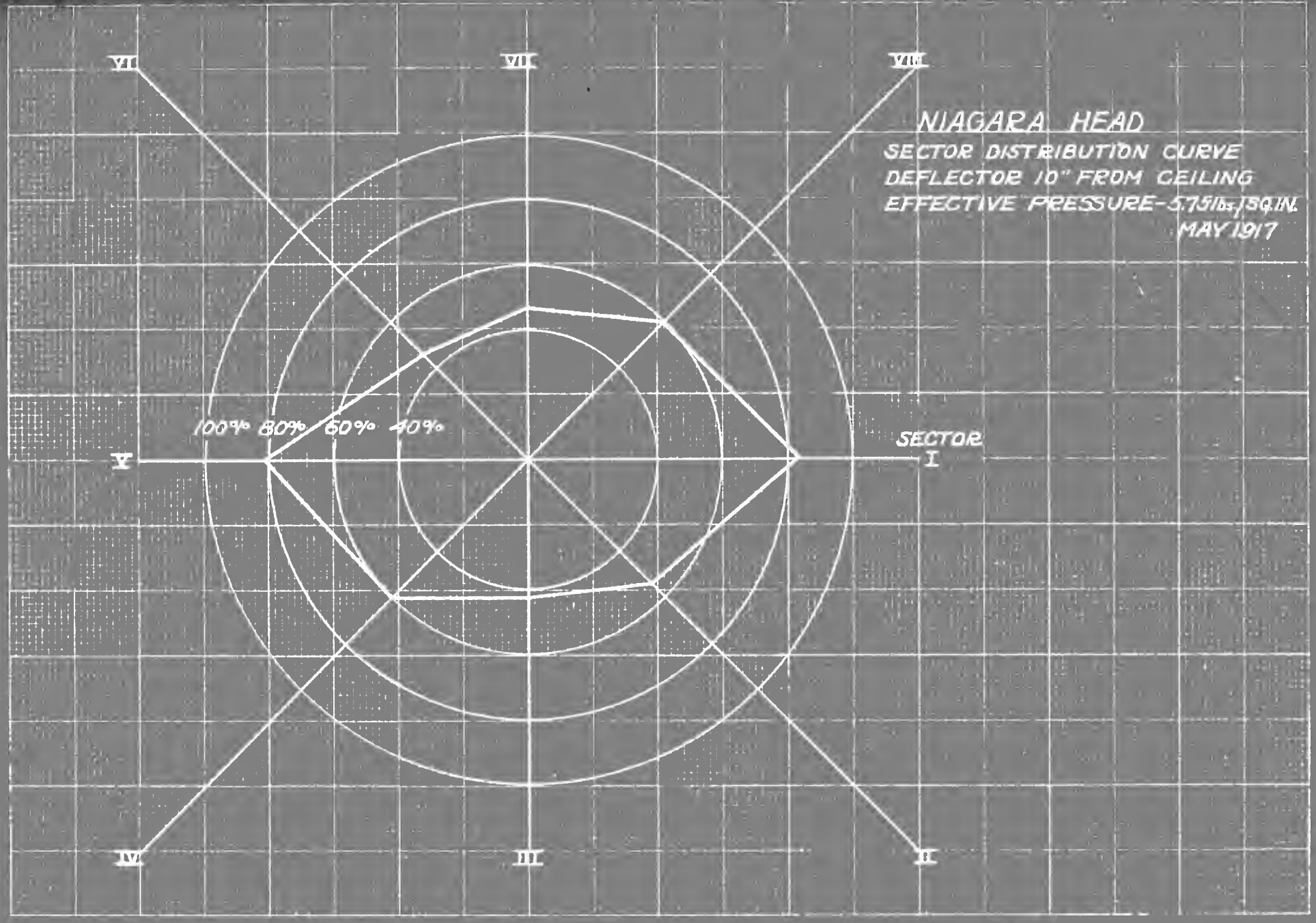

NIAGARA HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE-35.75 lb. /SQ.IN.
MAY 1917
100% 80% 60% 40%
SECTOR
I
II
III
IV
V
VI
VII
VIII

N I A G A R A H E A D

GAUGE PRESSURE, 5 lbs. sq. in; DEFLECTOR 10" FROM CEILING; EFFECTIVE PRESSURE, 5.75 lbs. sq. in.
5 min. runs.

	SECTORS								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	2.5	13.0	3.0	1.5	4.5	4.0	2.5	1.0	22.0				
2	1.25	1.75	1.75	0.75	1.75	1.25	1.75	0.75	11.00	A- 63.75	7.65	.024	10.50
3	3.75	1.25	1.25	0.75	1.75	0.75	1.25	0.75	11.50				
4	5.75	2.25	1.75	1.75	1.50	2.25	2.25	1.75	19.25				
5	2.60	3.1	2.6	4.6	5.1	4.6	2.6	5.1	30.3	B- 59.8	7.18	.0415	9.93
6	12.75	2.25	2.25	1.75	2.75	2.75	2.25	2.75	29.50				
7	3.50	3.0	2.0	13.0	5.5	4.0	3.0	9.0	43.0	C- 72.1	8.67	.0613	11.97
8	12.70	2.2	2.7	1.2	2.7	3.2	2.2	2.2	291				
9	3.4	2.9	2.4	4.9	3.9	1.9	2.9	3.4	25.7	D- 42.7	5.10	.0464	7.05
10	2.75	2.75	1.75	1.25	2.75	1.75	1.25	2.75	17.00				
11	4.50	8.5	4.5	4.0	5.5	3.5	5.5	9.5	45.5	E- 45.5	5.45	.0695	7.53
12	7.5	7.5	5.0	10.0	23.5	3.5	7.5	7.0	71.5	F- 71.5	8.60	.137	11.85
Total Pounds	62.95	40.45	30.95	45.45	61.20	33.45	34.95	45.95					58.83
Total Gallons	7.55	4.85	3.72	5.45	7.35	4.03	4.18	5.5					
QSector	1.8125	1.8125	1.8125	1.8125	1.8125	1.8125	1.8125	1.8125	14.5 Gals.				
% in Sector	83.25	53.5	42.0	60.0	81.0	45.5	46.1	60.5					

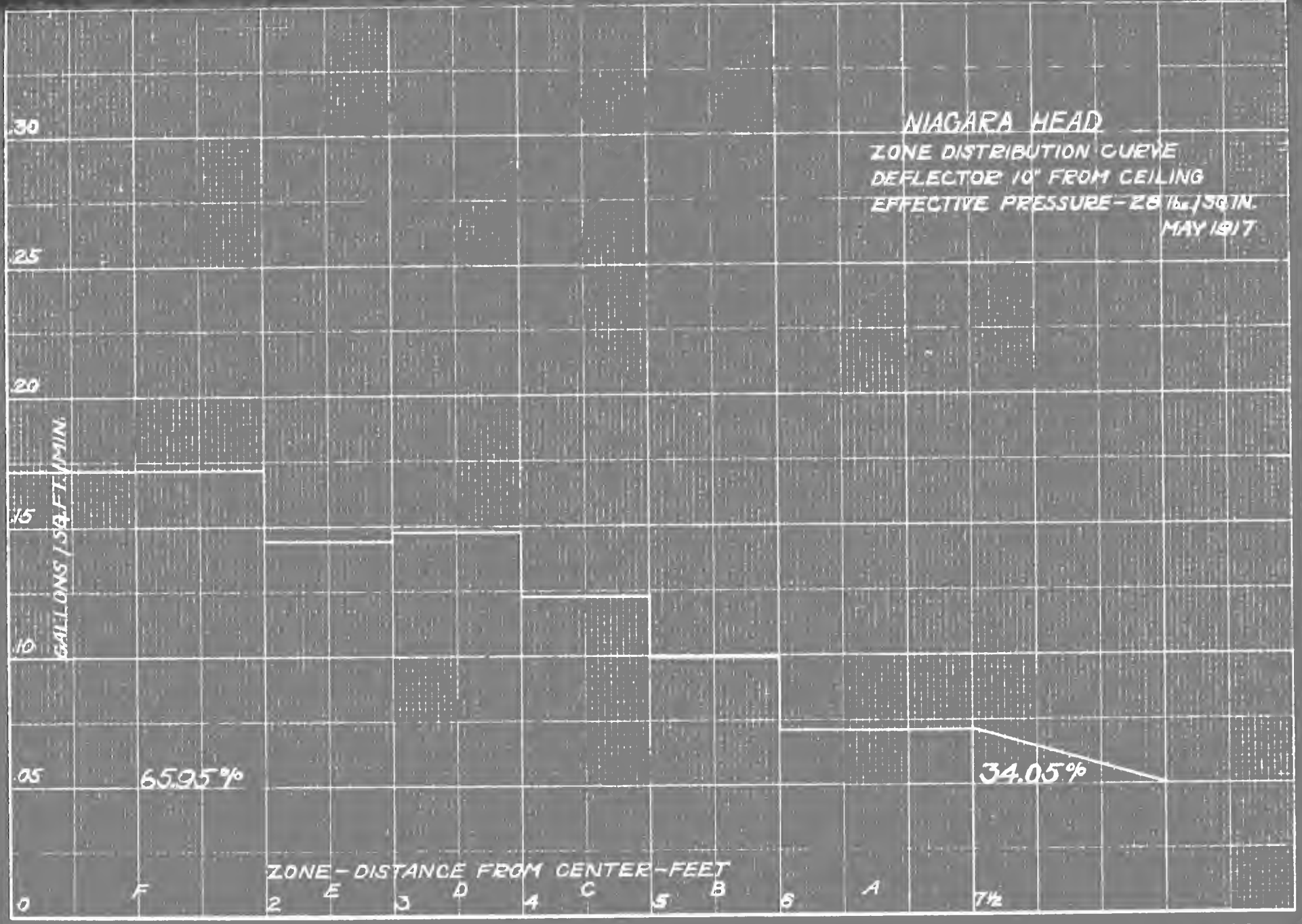

NIAGARA HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE – 5.75 lbs/SQ.IN.
MAY 1917
30
25
20
15
10
05
GALLONS/SQ.FT./MIN.
58.83%
41.17%
ZONE – DISTANCE FROM CENTER – FEET
0
F
2
E
3
D
4
C
5
B
6
A
7½

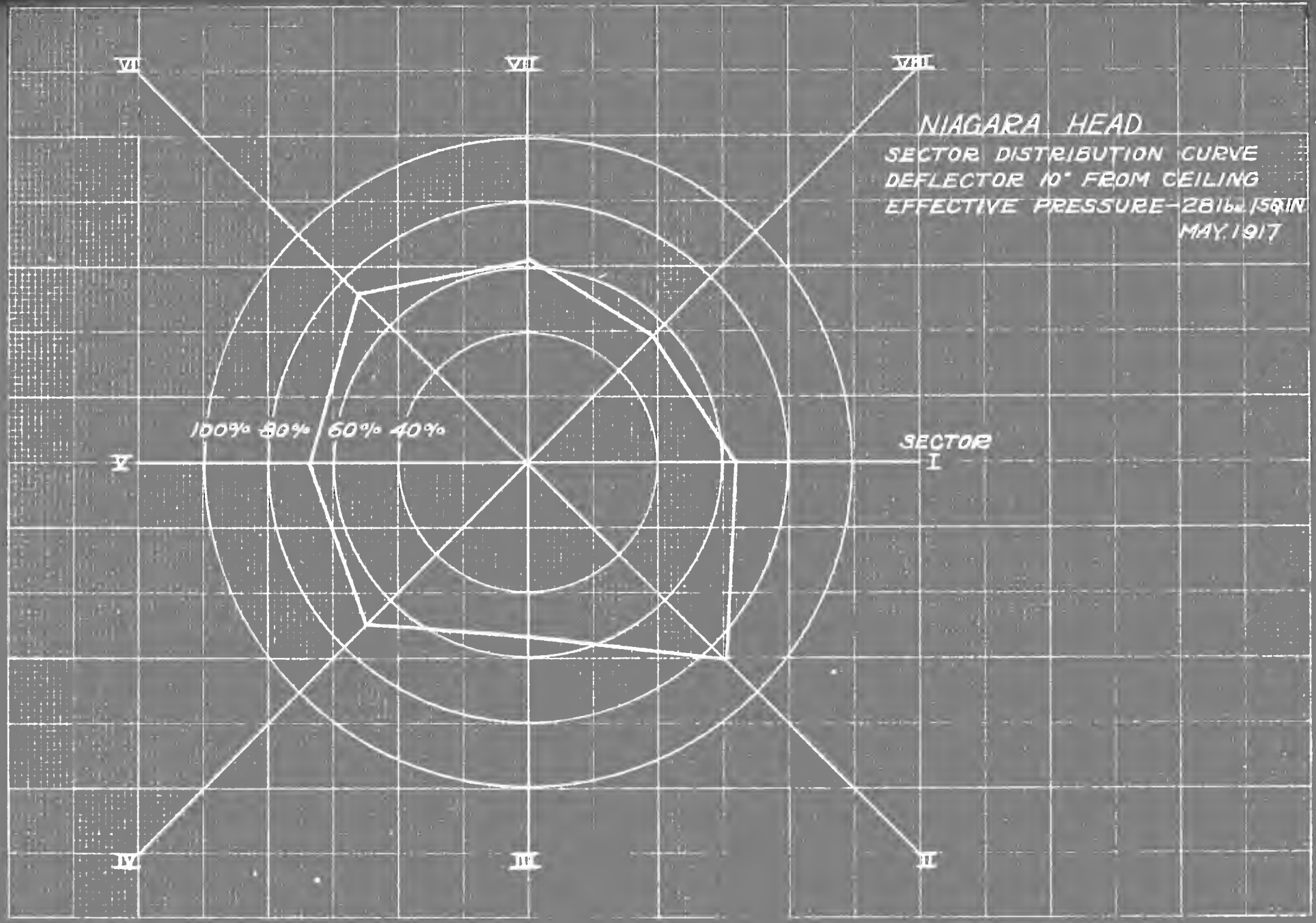

NIAGARA HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE-5.75lbs./SQ.IN.
MAY 1917
VI
VII
VIII
V
SECTOR I
100% 80% 60% 40%
IV
III
II

N I A G A R A H E A D

GAUGE PRESSURE, 25 lbs. sq. in; DEFLECTOR 10" FROM CEILING; EFFECTIVE PRESSURE, 28.0 lbs. sq. in.
5 min. runs.

	S E C T O R S												
PANS	I	II	III	IV	V	VI	VII	VIII	Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
1	7.00	4.50	7.50	15.50	8.50	9.50	6.00	13.00	71.50				
2	2.75	8.25	4.25	4.25	2.75	5.75	5.75	3.75	37.50				
3	6.75	8.25	1.75	2.25	2.75	3.25	3.25	1.25	29.50	A-189.00	22.68	.0715	15.7
4	17.75	9.75	2.25	4.25	1.75	8.25	4.25	2.25	50.50				
5	8.60	10.60	10.10	12.60	11.10	10.60	12.10	9.10	84.80				
6	11.75	14.00	3.25	5.75	3.25	9.75	6.75	3.25	57.75	B-142.55	17.1	.099	11.8
7	7.00	16.25	11.50	8.50	14.50	11.00	12.00	4.50	85.25				
8	6.20	12.45	6.20	7.20	2.70	12.20	7.70	4.70	59.35	C-144.60	17.35	.123	11.95
9	7.40	14.40	8.40	6.40	9.40	9.40	8.90	3.40	67.70				
10	4.75	11.25	5.75	11.75	3.25	10.25	6.75	14.25	68.00	D-135.70	16.27	.148	11.2
11	10.00	13.00	13.50	13.00	10.00	12.50	12.00	10.50	94.50	E- 94.5	11.34	.1445	7.85
12	7.00	6.50	6.50	15.00	32.00	7.50	7.50	8.00	90.00	F- 90.00	10.8	.172	7.45
													65.95
Total Pounds	96.95	129.20	80.95	106.45	101.95	109.95	92.95	77.95					
Total Gallons	11.63	15.6	9.7	12.75	12.20	13.2	11.15	9.85					
QSector	3.625	3.625	3.625	3.625	3.625	3.625	3.625	3.625	29.0 Gals.				
% in Sector	64.0	86.	53.5	70.5	67.3	73.8	61.5	54.3					

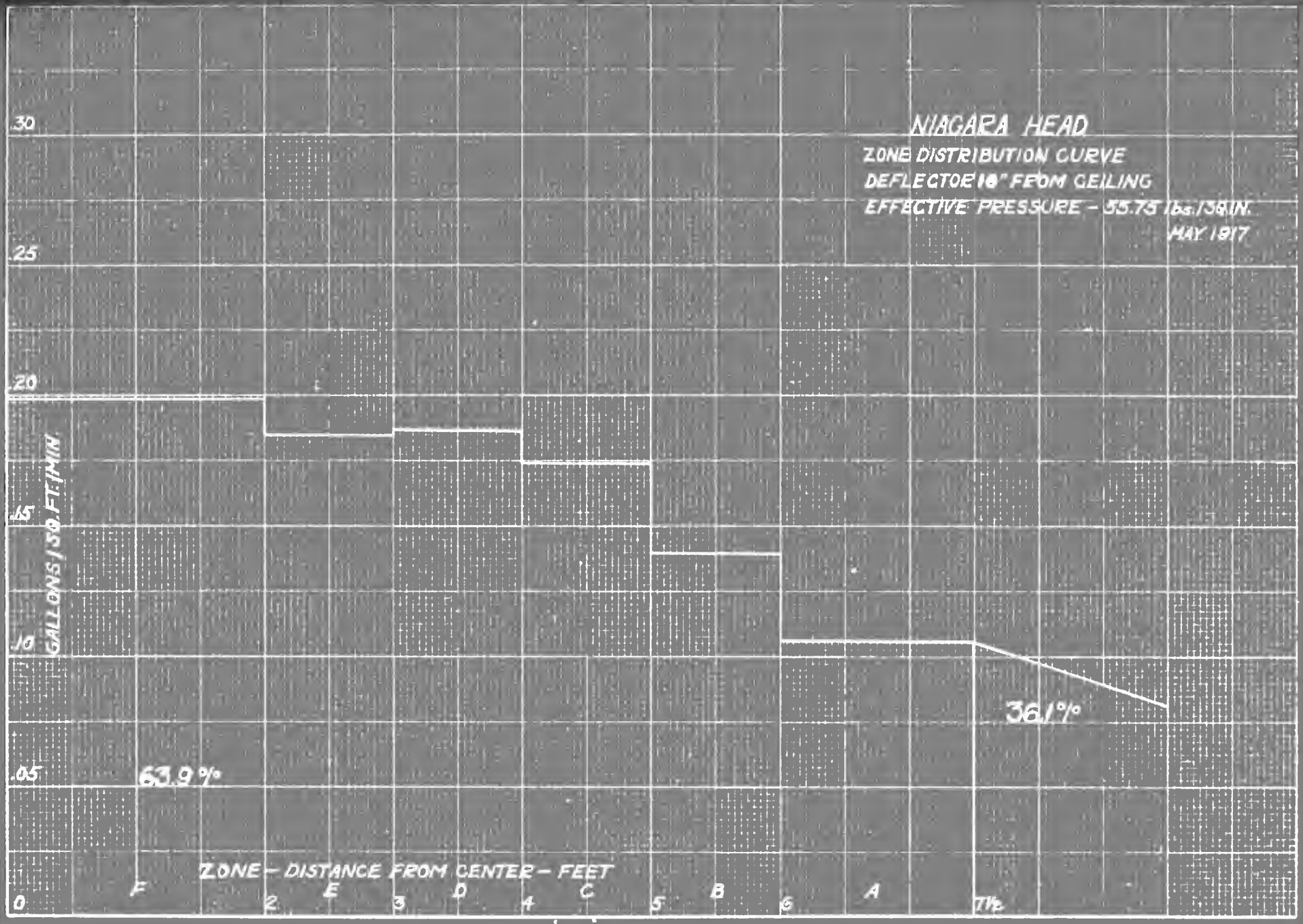

NIAGARA HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE - 28 lb. / SQ IN.
MAY 1917
30
25
20
15
10
05
0
GALLONS / SQ. FT. / MIN.
65.95%
34.05%
ZONE - DISTANCE FROM CENTER - FEET
F
2
E
3
D
4
C
5
B
6
A
7½

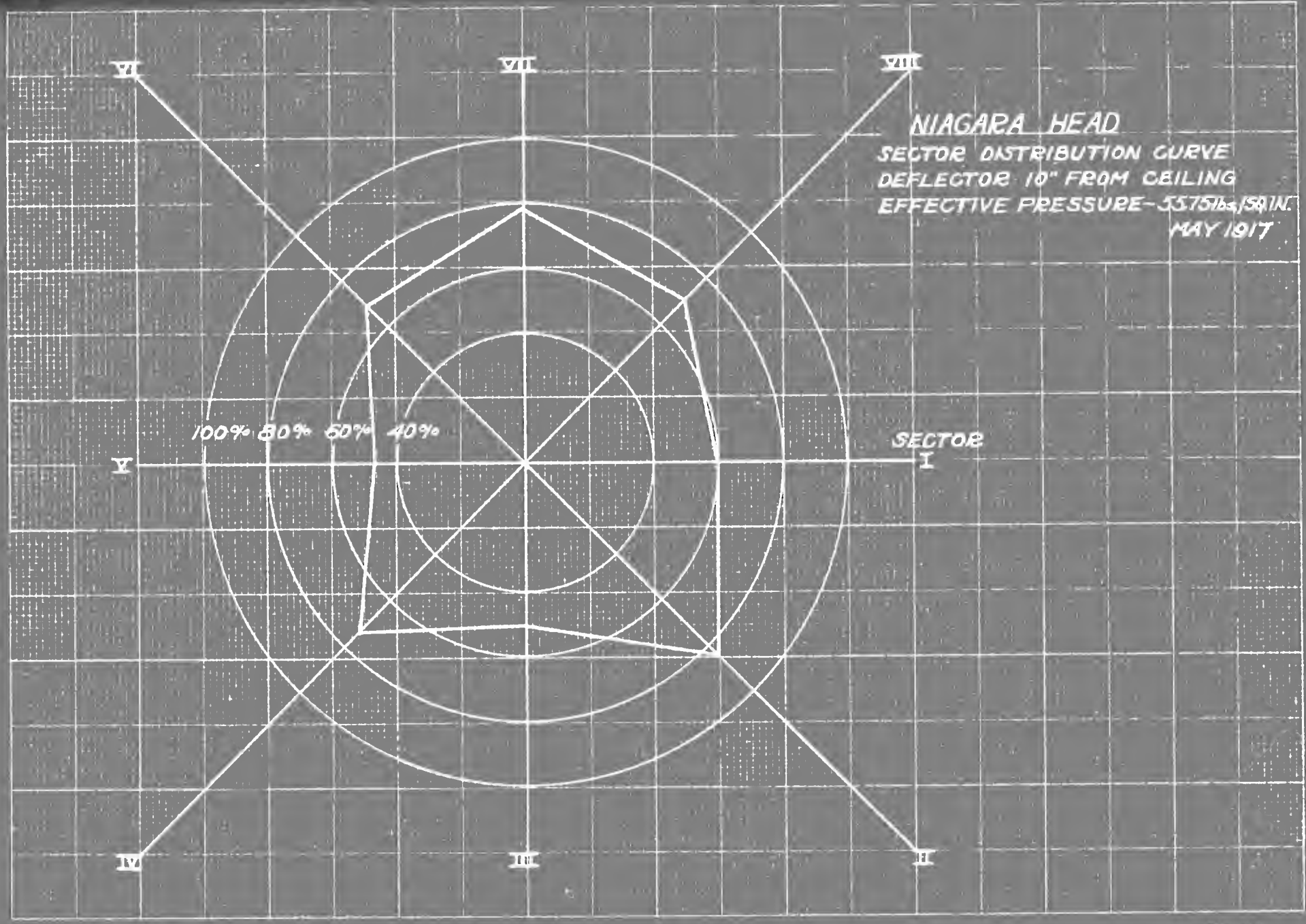

NIAGARA HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 10° FROM CEILING
EFFECTIVE PRESSURE-2.81 lbs./SQ.IN.
MAY. 1917
VII
VIII
VI
V
SECTOR I
100% 80% 60% 40%
IV
III
II

N I A G A R A H E A D

GAUGE PRESSURE, 50 lbs. sq. in; DEFLECTOR 10" FROM CEILING; EFFECTIVE PRESSURE, 55.75 lbs. sq. in.
5 min. runs.

	S E C T O R S								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	9.0	9.5	15.0	16.0	8.5	11.0	14.5	18.5	102.0				
2	2.25	16.25	2.75	7.75	2.25	3.75	10.25	16.0	61.25	A-279.25	33.6	.1055	16.8
3	4.75	11.25	1.25	2.75	2.75	8.25	8.25	5.75	45.00				
4	11.75	13.75	2.25	9.75	1.75	12.75	14.25	4.75	71.00				
5	9.1	21.1	11.1	14.6	11.6	12.1	15.6	19.1	114.3				
6	11.25	16.25	3.25	11.25	3.25	16.25	16.75	9.25	87.50	B-201.8	24.2	.140	12.1
7	9.5	24.0	15.0	12.0	11.0	13.5	15.0	11.5	111.5				
8	8.2	13.7	6.2	16.2	3.7	13.7	15.2	14.7	91.6	C-203.1	24.4	.1725	12.2
9	9.4	12.9	9.9	13.4	8.9	11.4	10.4	6.9	83.2				
10	6.25	13.25	7.25	15.25	3.75	12.75	13.75	16.25	88.50	D-171.7	20.6	.187	10.3
11	13.5	12.5	18.0	14.5	11.5	15.5	19.5	15.5	120.5	E-120.5	14.5	.185	7.25
12	7.5	8.5	9.5	19.0	28.0	12.25	9.5	10.0	104.25	F-104.25	12.5	.199	6.25
													63.90
Total Pounds	102.45	172.95	101.45	152.45	96.96	143.20	162.95	148.20					
Total Gallons	12.3	20.8	12.2	18.3	11.6	17.2	19.5	17.8					
QSector	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	40.0 Gals.				
% in Sector	59.2	83.2	48.8	73.2	46.4	68.8	78.0	71.2					

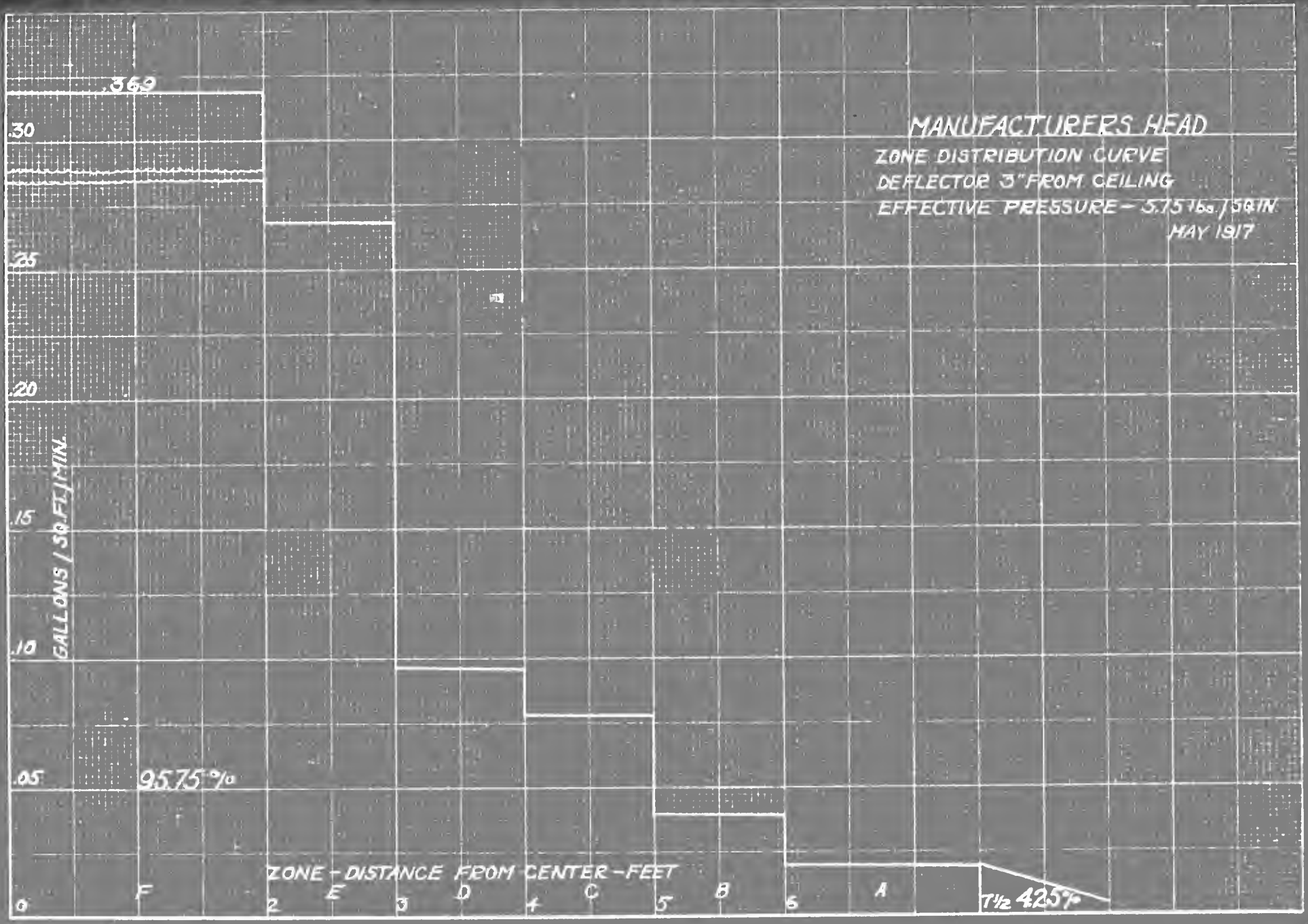

NIAGARA HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 18" FROM CEILING
EFFECTIVE PRESSURE - 55.75 lbs./SQ.IN.
MAY 1917
30
25
20
15
10
.05
GALLONS / 30 FT./MIN
63.9 %
36.1 %
ZONE - DISTANCE FROM CENTER - FEET
0
F
2
E
3
D
4
C
5
B
6
A
7½

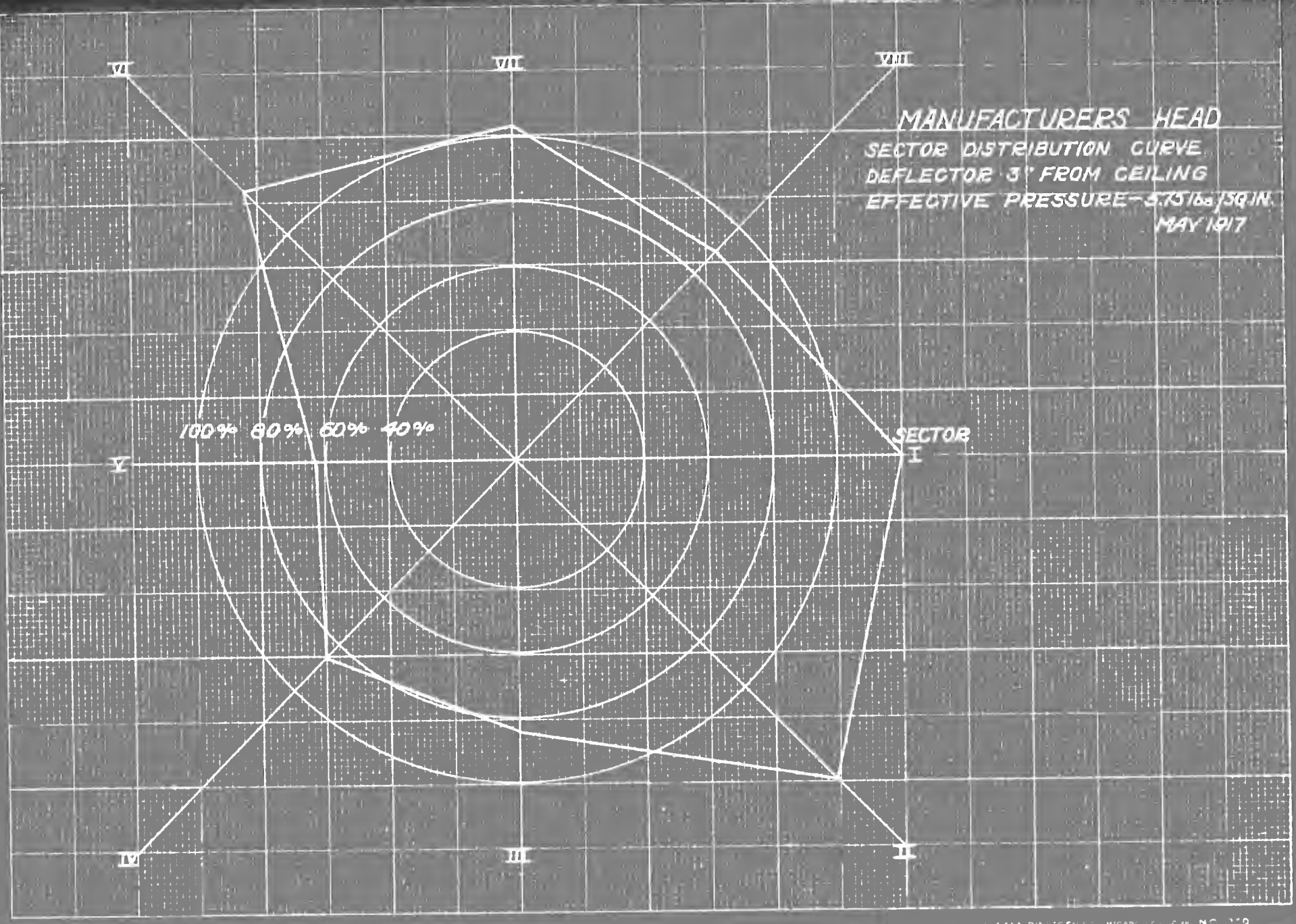

NIAGARA HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE-5575lbs/SQ IN.
MAY 1917
VI
VII
VIII
V
SECTOR
I
100%
80%
60%
40%
IV
III
II

MANUFACTURER'S HEAD

GAUGE PRESSURE, 5 lbs. sq. in; DEFLECTOR 3" FROM CEILING; EFFECTIVE PRESSURE, 5.75 lbs. sq. in. 10 min. runs.

	SECTORS								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	3.7	3.5	1.75	2.5	.75	3.50	4.0	3.3	23.0				
2	1.95		7.25	3.75	1.00	2.00	4.5	4.25	24.0	A-104.	12.50	.0196	7.6
3	1.75	6.25	1.75	4.75	1.50	2.75	5.0	4.25	28.0				
4	2.25	5.25	2.25	3.75	3.50	4.25	4.25	3.25	28.8				
5	4.6	7.6	3.6	5.35	4.85	6.6	8.35	6.6	47.6	B-112.	13.45	.039	8.15
6	4.55	14.5	7.5	9.75	1.75	9.25	10.0	7.25	64.55				
7	5.0	31.75	6.0	7.75	6.00	16.5	11.75	10.0	94.75	C-185.	22.2	.0785	13.45
8	7.7	15.95	12.7	13.95	2.45	14.2	13.7	9.9	90.55				
9	4.9	16.4	8.4	8.9	5.40	22.9	9.9	10.9	87.7	D-176.	21.1	.096	12.8
10	10.25	9.75	13.75	14.0	3.00	12.75	14.75	10.25	88.5				
11	55.3	75.5	25.5	30.0	16.75	48.0	42.5	57.7	351.25	E-351.	42.2	.2685	25.6
12	41.3	48.5	58.7	40.5	61.50	62.0	48.75	24.3	386.0	F-386.	46.4	.369	28.15
Total Pounds	143.25	239.7	143.15	144.35	108.45	204.7	177.45	151.95					95.75
Total Gallons	17.2	28.8	17.2	17.4	13.0	24.65	21.3	18.25					
QSector	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	16.5 Gals.				
% in Sector	83.5	140.	83.5	84.5	63.0	120.	103.5	88.6					

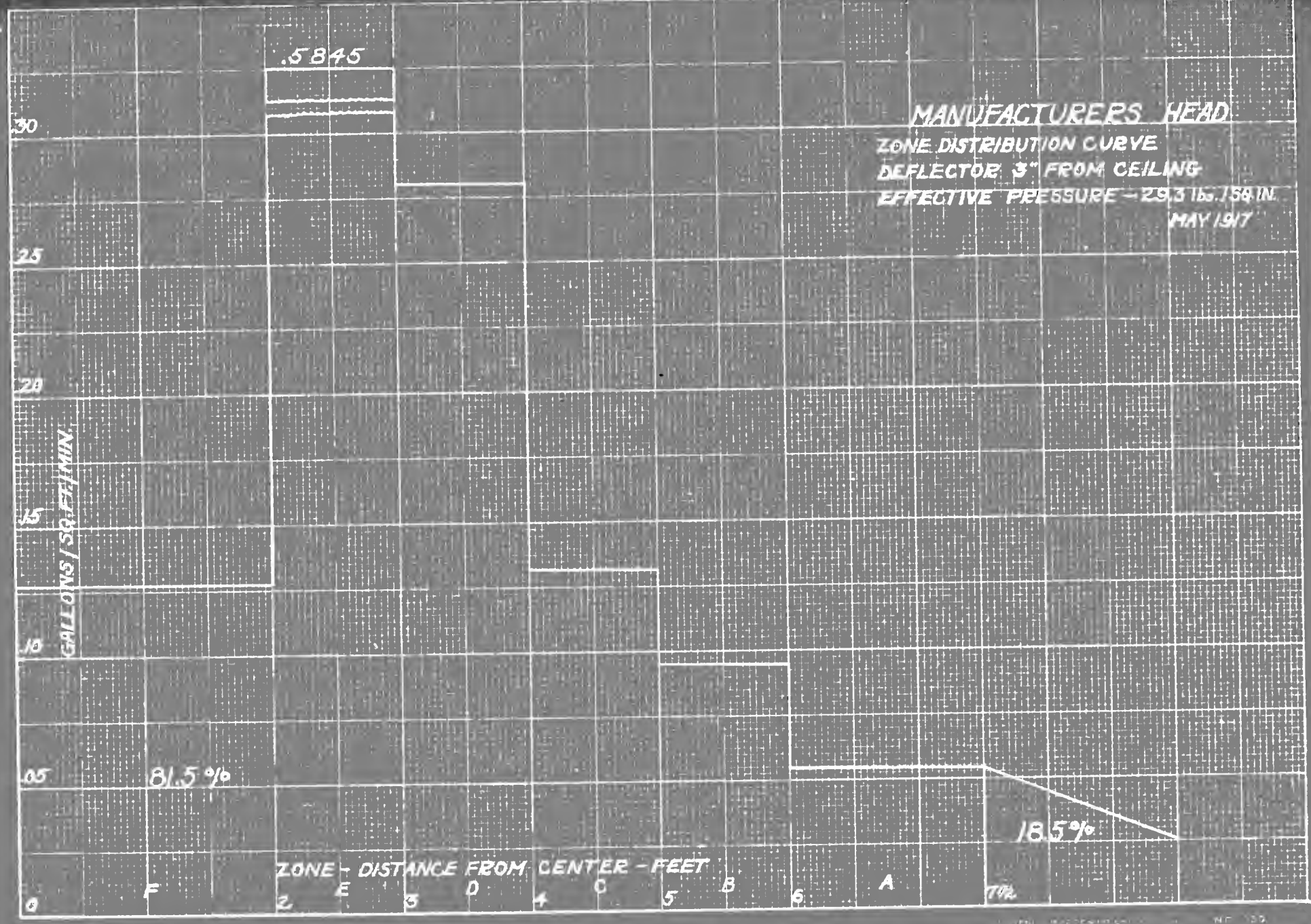

MANUFACTURERS HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE – 5.15 lbs. / SQ IN.
MAY 1917
.369
.30
.25
.20
.15
.10
.05
GALLONS / SQ FT / MIN.
95.75 %
ZONE – DISTANCE FROM CENTER – FEET
0
F
2
E
3
D
4
C
5
B
6
A
T½ 4.25%

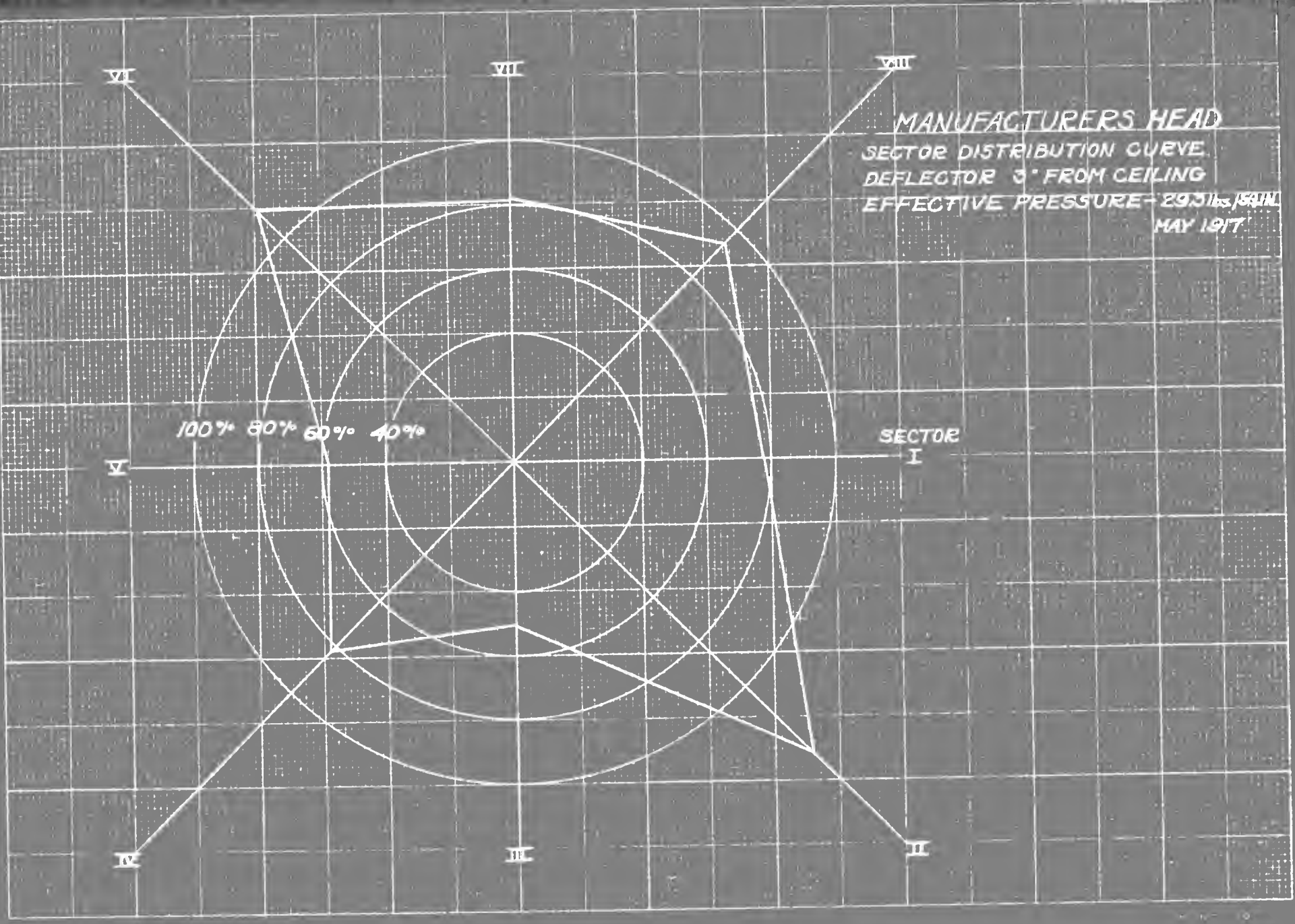

MANUFACTURERS HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE - 5.75 lbs/SQ IN.
MAY 1917
100% 80% 60% 40%
SECTOR I
VI
VII
VIII
V
IV
III
II

M A N U F A C T U R E R ' S H E A D

GAUGE PRESSURE, 25 lbs. sq. in; DEFLECTOR 3" FROM CEILING; EFFECTIVE PRESSURE, 29.3 lbs. sq. in.
5 min. runs.

	S E C T O R S								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	2.75	10.50	4.75	2.0	2.5	3.25	5.3	3.25	34.3				
2	1.75	13.75	3.50	4.75	1.5	3.0	4.25	4.75	37.25	A-143.25	17.2	.0545	10.28
3	2.0	8.75	3.25	7.75	1.25	3.25	3.95	8.5	38.70				
4	2.75	4.25	5.25	6.0	.75	2.75	3.50	7.75	33.0				
5	3.85	16.85	7.35	5.85	3.10	12.1	8.60	7.10	64.8				
6	4.50	9.75	8.5	12.75	2.0	7.25	8.95	15.0	68.70	B-133.5	16.0	.0925	9.56
7	6.25	12.25	9.0	6.25	4.75	15.5	9.5	9.5	73.0				
8	4.20	11.7	9.2	15.7	2.7	10.45	9.9	17.7	81.55	C-154.55	18.55	.1310	11.10
9	28.40	25.9	17.9	7.4	16.15	10.9	24.4	28.9	159.0				
10	6.75	53.25	11.25	31.25	3.75	40.0	15.25	35.5	197.0	D-256.95	30.8	.280	18.4
11	58.0	53.75	62.0	30.25	40.2	74.5	43.0	19.0	382.37	E-382.37	45.9	.5845	27.4
12	5.25	4.75	5.75	11.5	23.0	5.75	4.8	5.5	66.3	F- 66.3	7.95	.127	4.75
													81.49
Total Pounds	126.45	225.45	87.7	141.45	101.65	188.70	141.40	162.45					
Total Gallons	15.2	27.05	10.55	17.0	12.2	22.6	17.0	19.5					
QSector	4.1875	4.1875	4.1875	4.1875	4.1875	4.1875	4.1875	4.1875	33.5 Gals.				
% in Sector	77.6	129.0	50.3	81.2	58.3	112.7	81.3	93.0					

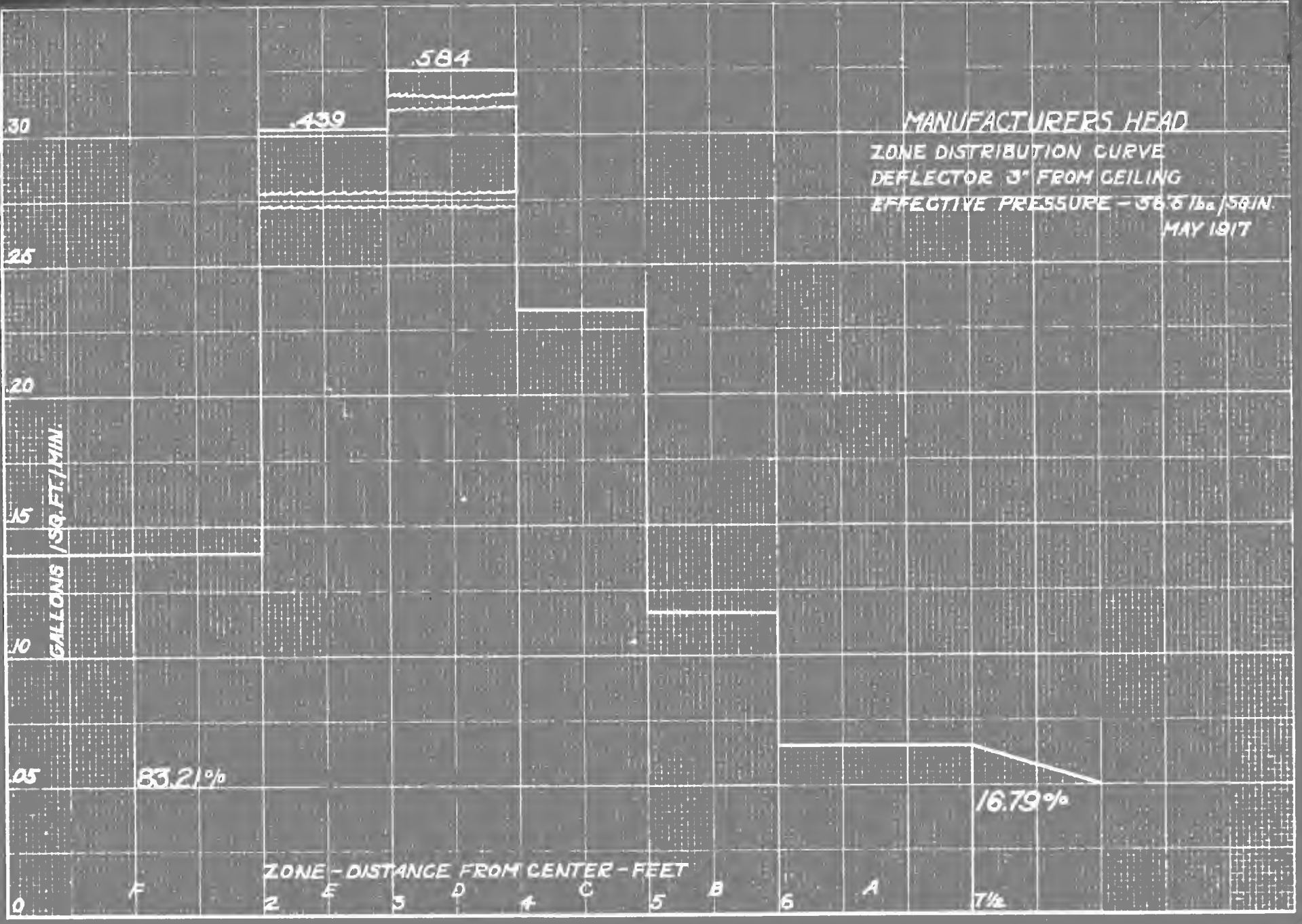

.5845
MANUFACTURERS HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE – 29.3 lbs./59 IN.
MAY 1917
GALLONS / SQ. FT./MIN.
30
25
20
15
10
05
81.5 %
18.5%
ZONE – DISTANCE FROM CENTER – FEET
0
F
2
E
3
D
4
C
5
B
6
A
7½

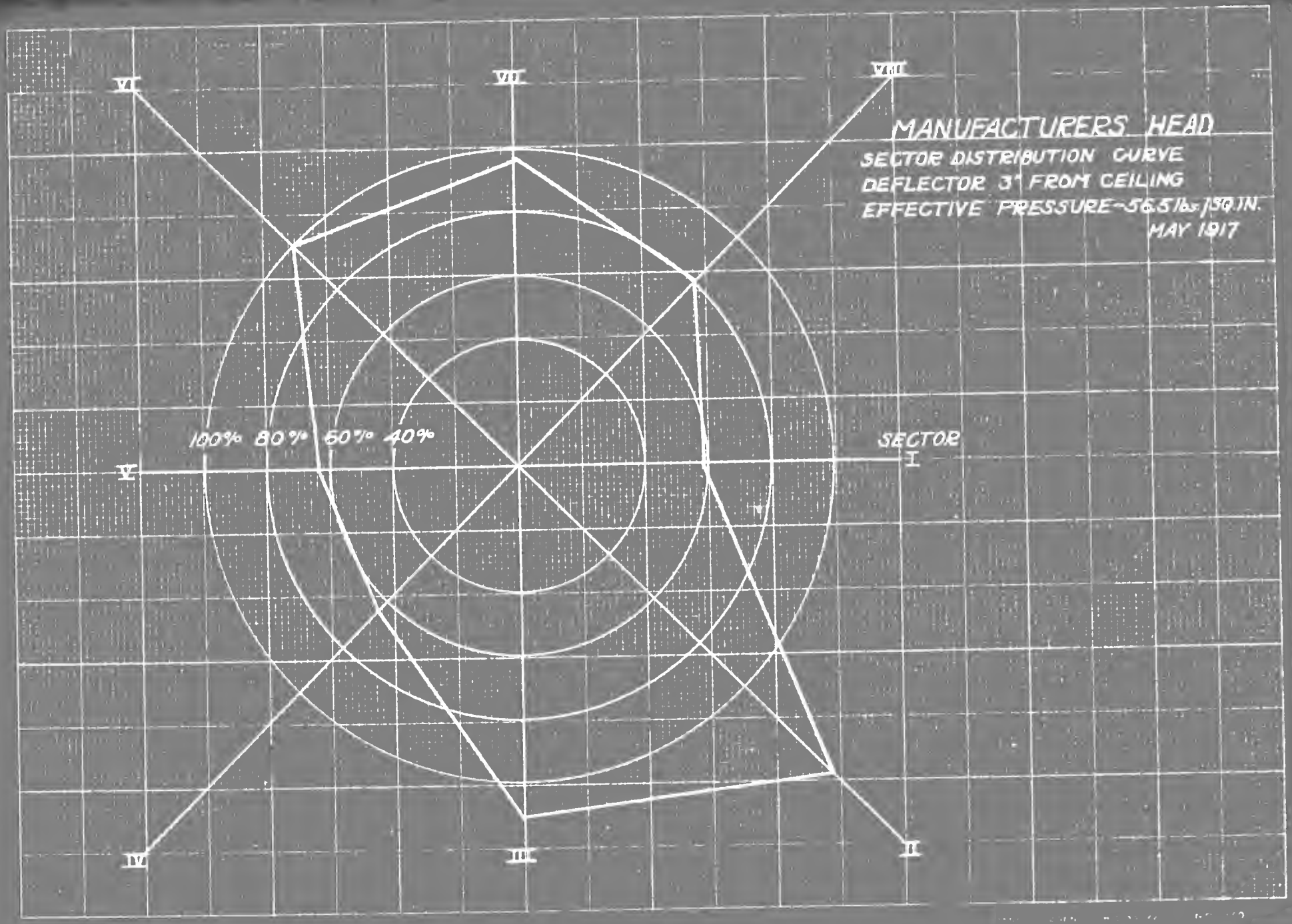

MANUFACTURERS HEAD
SECTOR DISTRIBUTION CURVE.
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE - 29.3 lbs./SQ.IN.
MAY 1917
VI
VII
VIII
100% 80% 60% 40%
SECTOR
I
V
IV
III
II

M A N U F A C T U R E R ' S H E A D

GAUGE PRESSURE, 50 lbs. sq. in; DEFLECTOR 3" FROM CEILING; EFFECTIVE PRESSURE, 56.5 lbs. sq. in.
5 min. runs.

	SECTORS								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	3.0	9.5	8.75	2.5	4.0	7.5	8.25	2.	45.5				
2	1.75	13.75	7.5	3.0	2.75	7.0	5.25	2.75	43.75	A-172.50	20.7	.0650	10.1
3	1.25	9.75	5.75	4.25	2.25	5.25	5.0	5.75	39.25				
4	1.75	4.5	6.75	6.5	1.75	3.75	5.75	13.25	44.0				
5	4.6	19.6	18.6	3.85	5.1	15.35	14.1	4.6	85.8	B-167.8	20.1	.1165	9.63
6	2.5	12.25	17.25	9.75	3.0	10.5	9.25	17.5	82.0				
7	14.5	18.0	30.0	5.0	11.0	12.5	32.5	8.5	132.0	C-272.1	32.7	.2320	15.2
8	2.7	23.45	21.7	16.7	3.2	16.0	14.7	41.7	140.1				
9	36.4	57.65	48.4	13.9	37.4	17.4	22.9	27.9	261.45	D-525-70	64.1	.584	31.2
10	6.75	68.75	36.75	36.5	4.75	51.75	38.0	20.5	263.75				
11	44.0	51.5	28.5	25.0	37.0	59.0	21.5	20.5	287.0	E-287.0	34.4	.439	16.8
12	6.0	6.0	6.25	9.75	23.5	8.25	7.0	6.5	73.25	F- 73.25	8.8	.140	4.28
Total Pounds	125.2	294.7	236.20	136.7	135.7	214.15	204.20	171.45					83.21
Total Gallons	15.05	35.4	28.4	16.4	16.3	25.8	24.6	20.6					
QSector	5.125	5.125	5.125	5.125	5.125	5.125	5.125	5.125	41.0 Gals.				
% in Sector	58.5	138.0	110.5	64.0	63.5	100.5	96.0	80.2					

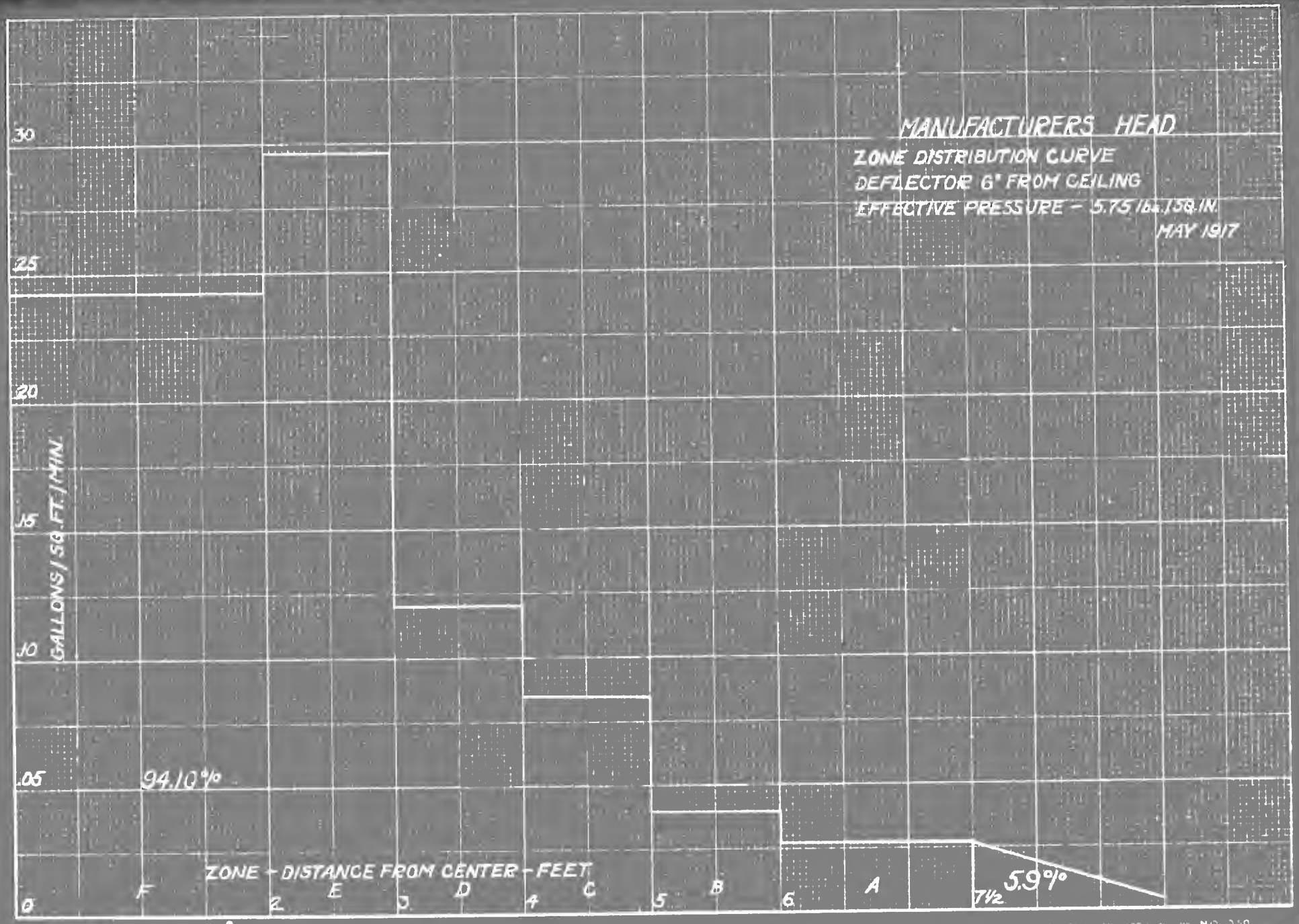

MANUFACTURERS HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE – 56.6 lbs./SQ.IN.
MAY 1917
.584
.439
.30
.25
.20
.15
.10
.05
0
GALLONS / SQ. FT. / MIN.
83.21%
16.79%
ZONE – DISTANCE FROM CENTER – FEET
F
2
E
3
D
4
C
5
B
6
A
7½

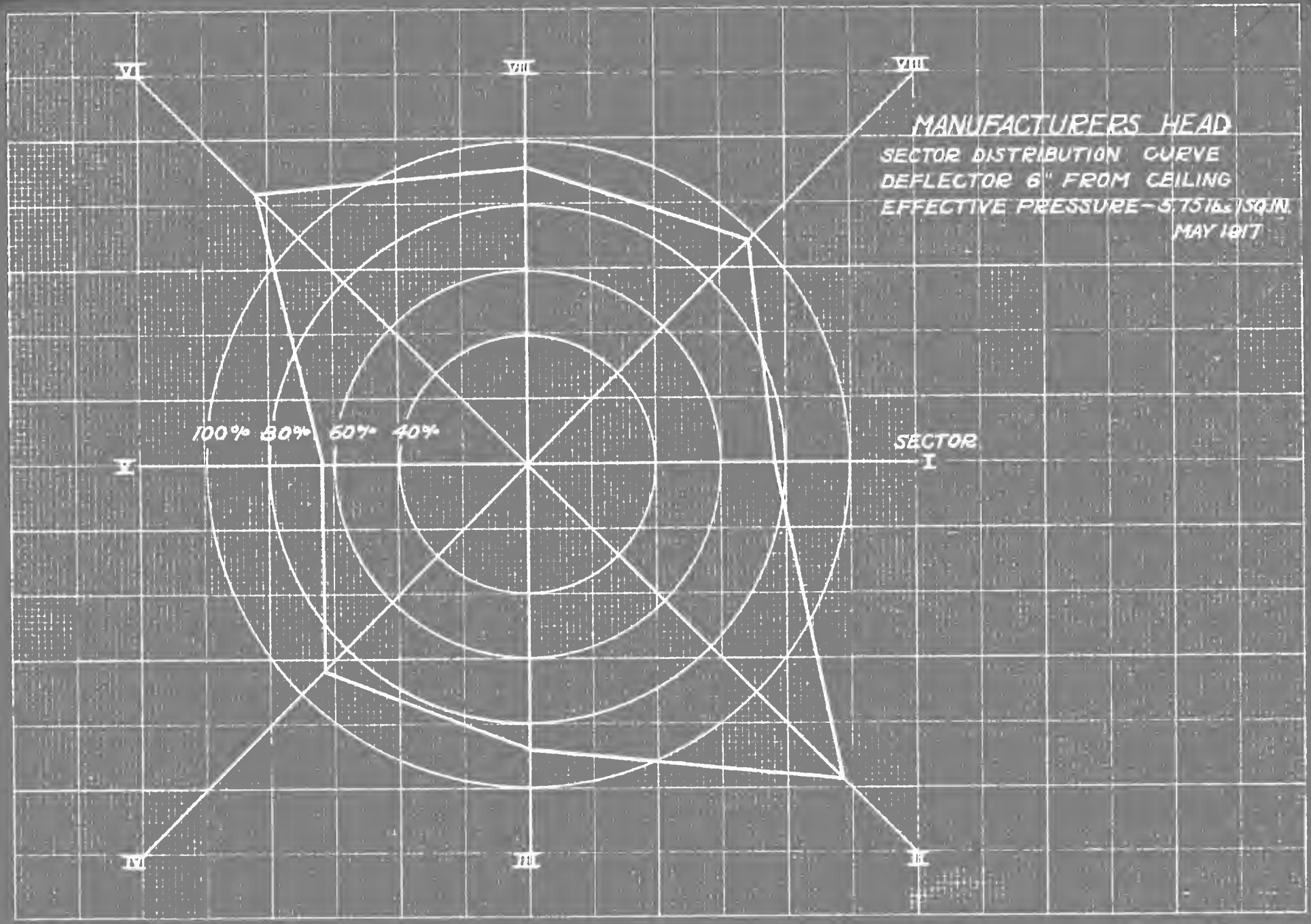

MANUFACTURERS HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 3" FROM CEILING
EFFECTIVE PRESSURE-56.5 lbs. 150 IN.
MAY 1917
VI
VII
VIII
V
SECTOR I
100% 80% 60% 40%
IV
III
II

MANUFACTURER'S HEAD

GAUGE PRESSURE, 5 lbs. sq. in; DEFLECTOR 6" FROM CEILING; EFFECTIVE PRESSURE, 5.75 lbs. sq. in.
7 min. runs.

PANS	SECTORS I	II	III	IV	V	VI	VII	VIII	Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
1	3.0	2.0	2.0	1.75	2.75	2.75	2.75	2.5	19.5				
2	1.25	2.25	1.25	2.75	1.0	1.75	3.0	3.75	17.0				
3	.75	3.25	2.25	3.5	.75	2.0	3.75	3.5	19.75	A- 76.75	9.23	.027	8.0
4	1.25	3.75	2.25	2.75	.75	3.75	3.25	2.75	20.5				
5	4.60	9.6	3.1	3.6	4.1	4.6	5.35	6.1	41.05				
6	2.50	10.25	6.25	7.25	1.25	7.25	7.0	6.5	38.25	B- 79.3	9.52	.0395	8.25
7	6.0	21.5	5.5	5.5	6.0	12.0	7.5	8.75	72.75				
8	4.2	14.95	9.7	11.45	1.7	12.2	9.95	8.70	72.85	C-145.60	17.5	.0885	15.15
9	66.5	13.4	7.4	6.5	6.15	18.9	6.9	10.4	75.95				
10	6.75	10.25	11.25	12.5	2.25	13.0	11.75	9.75	77.5	D-153.45	18.45	.12	16.0
11	40.75	45.25	24.0	29.0	19.5	37.75	28.5	45.5	270.25	E-270.25	32.5	.296	28.2
12	14.5	29.0	30.5	20.0	29.25	26.0	19.5	8.5	177.25	F-177.25	21.3	.243	18.5
Total Pounds	92.20	165.45	105.45	106.55	75.45	141.95	109.20	116.70					94.10
Total Gallons	11.1	19.9	12.7	12.8	9.05	17.0	13.1	14.0					
QSector	2.06	2.06	2.06	2.06	2.06	2.06	2.06	2.06	16.5 Gals.				
% in Sector	77.0	138.	88.2	88.8	62.8	118.0	91.0	97.0					

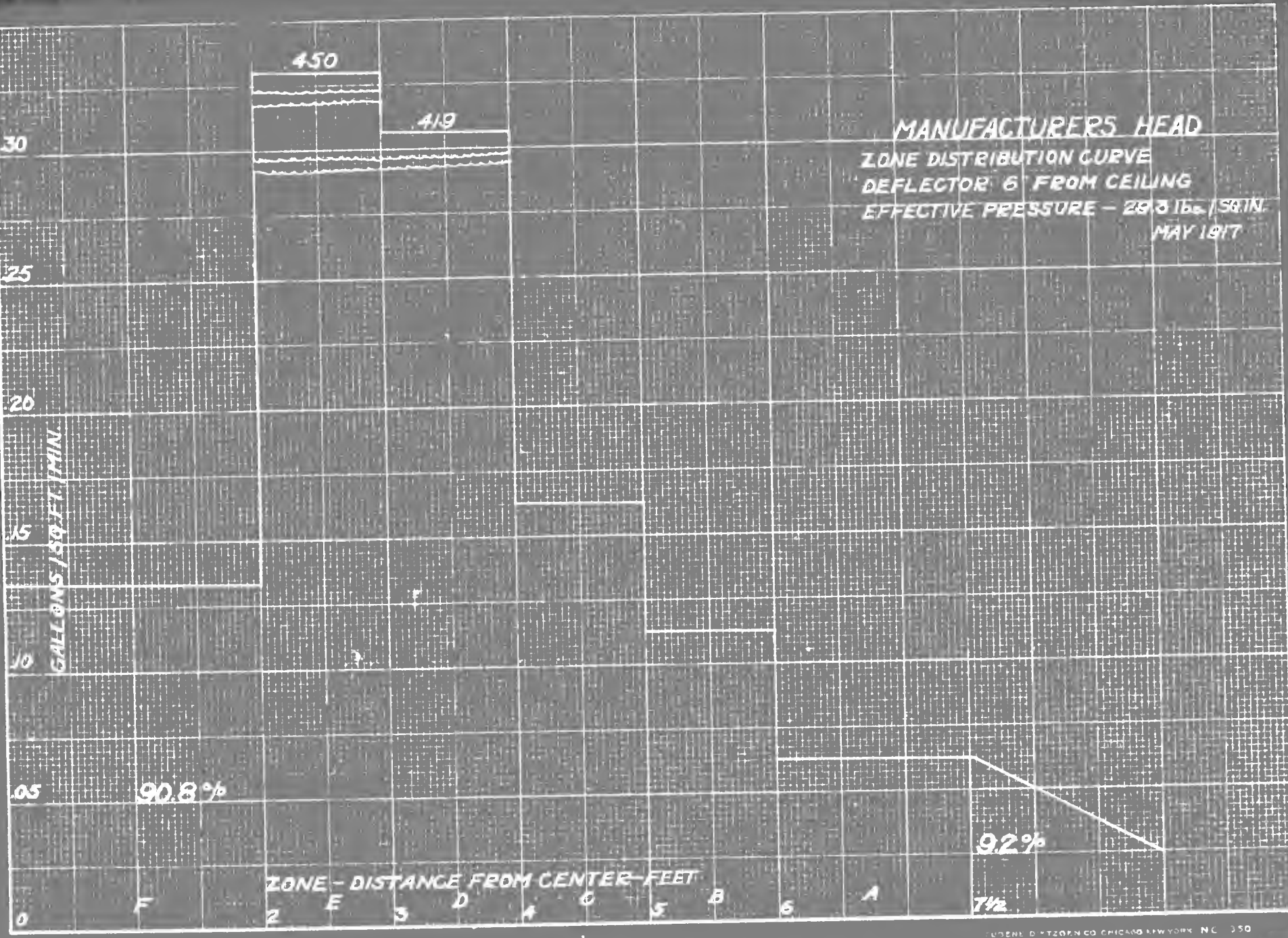

MANUFACTURERS HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE - 5.75 lbs. 150 IN.
MAY 1917
30
25
20
15
10
05
GALLONS / SQ. FT. / MIN.
94.10%
5.9%
ZONE - DISTANCE FROM CENTER - FEET
0
F
2
E
3
D
4
C
5
B
6
A
7½

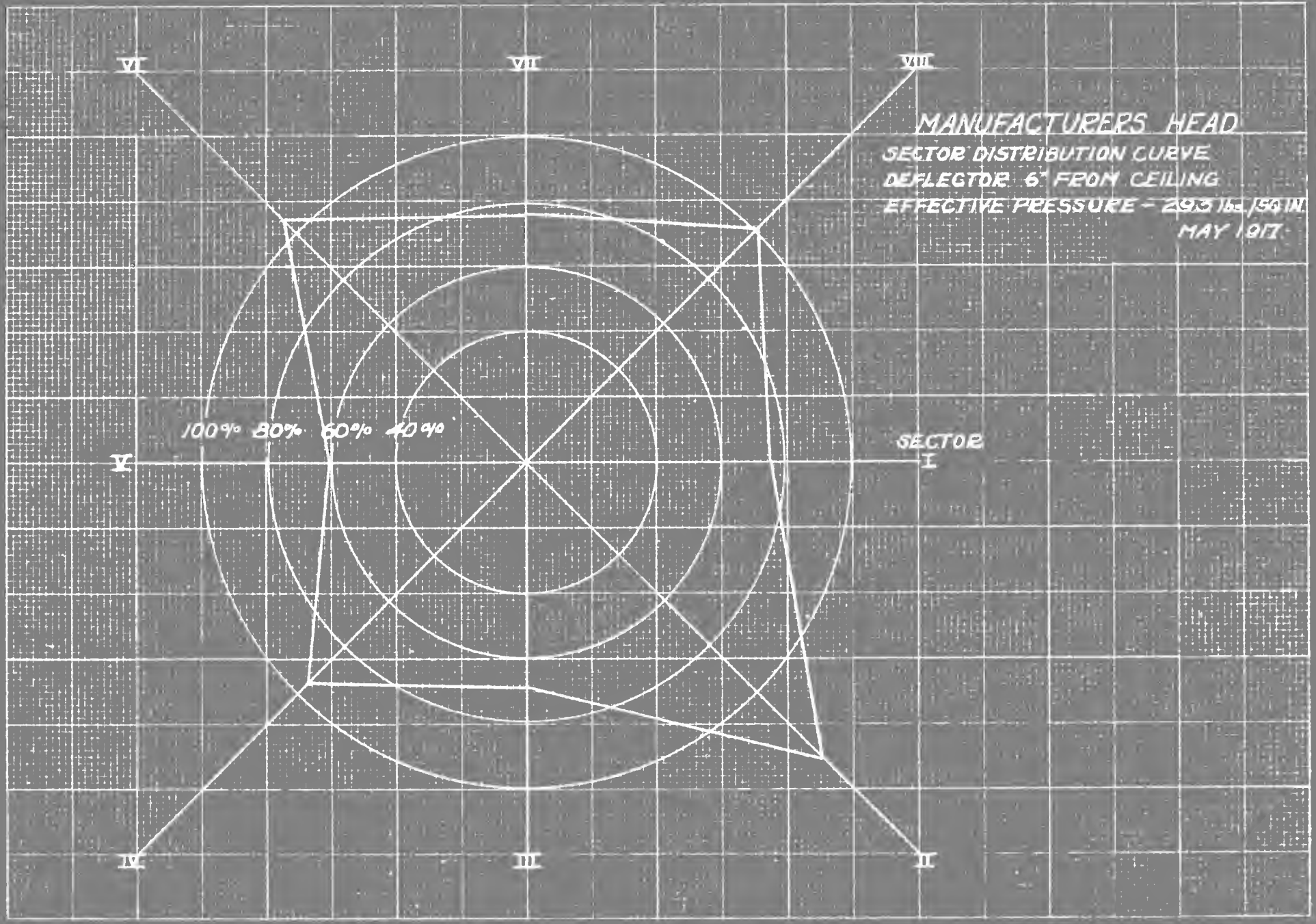

MANUFACTURERS HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE - 5.75 lbs. ISQ.IN.
MAY 1917
VI
VII
VIII
100%
80%
50%
40%
SECTOR
I
V
IV
III
II

M A N U F A C T U R E R ' S H E A D

GAUGE PRESSURE, 25 lbs. sq. in; DEFLECTOR 6" FROM CEILING; EFFECTIVE PRESSURE, 29.3 lbs. sq. in.
5 min. runs.

	S E C T O R S								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	4.0	12.75	3.75	2.0	3.75	3.0	4.5	5.5	39.25				
2	2.75	15.0	2.75	5.5	2.5	3.25	3.75	11.25	46.75	A-165.50	19.9	.0625	11.9
3	2.0	9.5	3.5	9.75	1.75	4.25	3.25	10.25	44.25				
4	2.25	5.25	6.75	6.75	.75	4.75	3.0	5.75	35.25				
5	5.6	19.1	8.35	7.1	4.85	13.1	7.85	14.85	80.8				
6	5.75	10.25	10.5	16.5	2.5	9.25	9.25	16.5	80.5	B-161.3	19.4	.1125	11.6
7	8.25	14.25	10.5	9.0	6.75	18.5	9.75	18.5	95.5				
8	6.95	12.7	9.95	20.0	3.45	12.45	12.2	18.2	95.85	C-191.35	23.0	.1625	13.7
9	35.15	31.4	18.4	11.9	26.65	13.4	22.9	28.9	188.7				
10	11.0	50.75	12.75	36.25	4.25	41.5	11.75	26.25	194.5	D-383.2	46.0	.419	27.5
11	41.2	35.25	49.25	25.75	33.5	59.0	36.0	14.0	294.0	E-294.0	35.3	.450	21.1
12	6.5	6.0	6.5	15.	14.25	7.25	7.0	7.0	69.5	F- 69.5	8.35	.133	5.0
													90.8
Total Pounds	131.4	222.20	142.95	165.50	104.95	189.70	131.20	176.95					
Total Gallons	15.7	26.7	17.2	19.9	12.6	22.8	15.8	21.2					
QSector	4.1875	4.1875	4.1875	4.1875	4.1875	4.1875	4.1875	4.1875	33.5 Gals.				
% in Sector	75.0	128.0	82.3	95.3	60.4	108.	75.5	101.5					

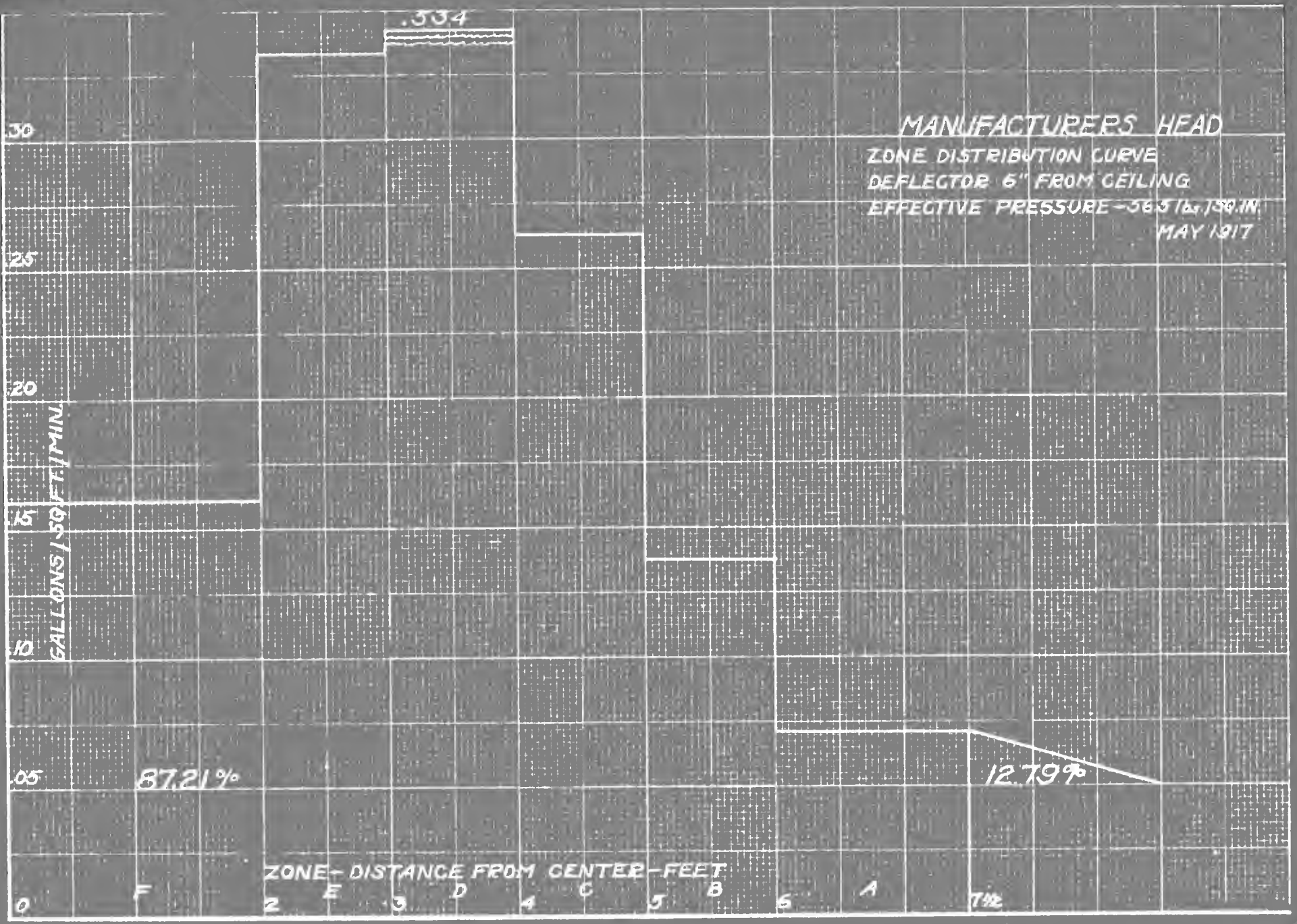


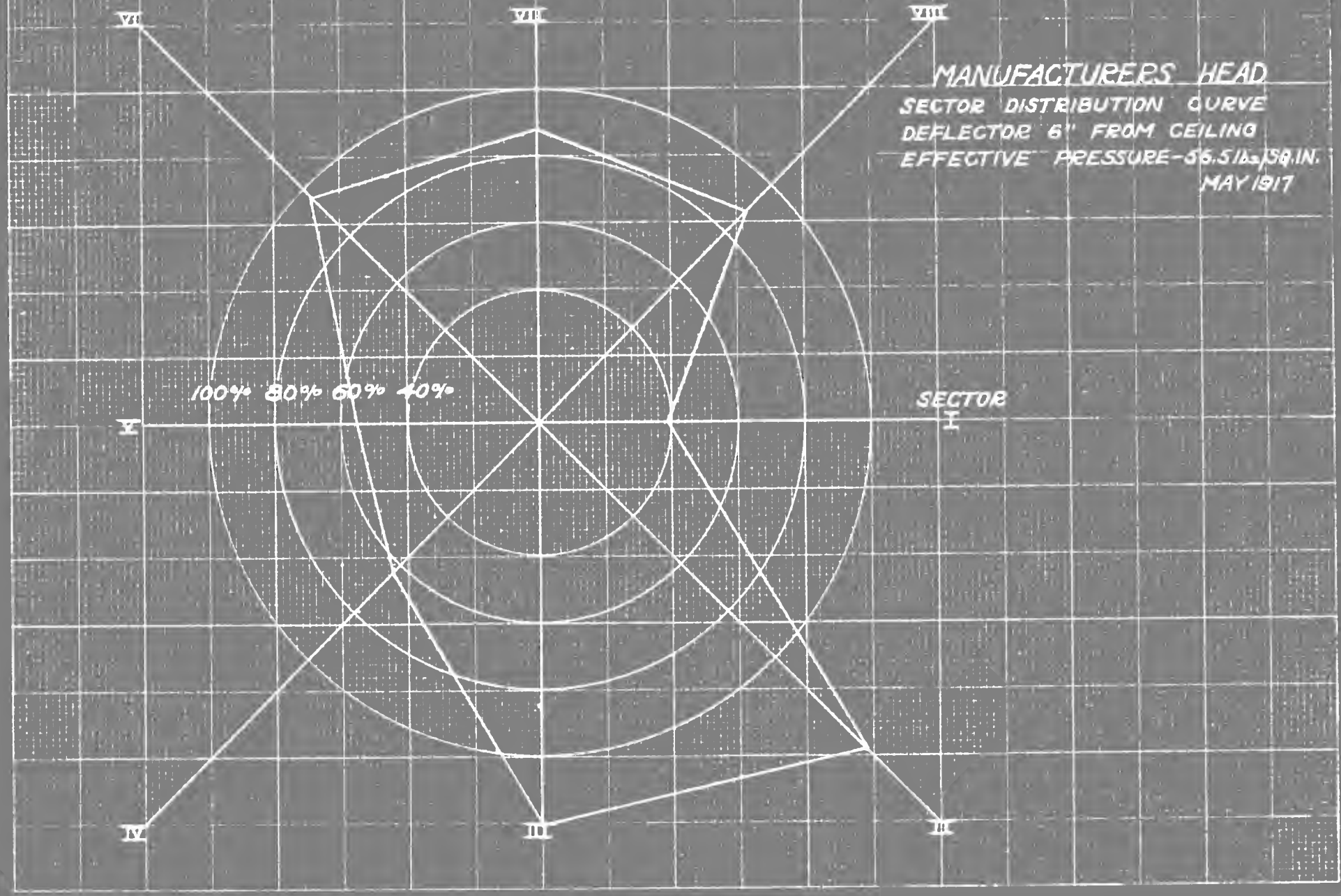

VI
VII
VIII
MANUFACTURERS HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE - 29.3 lbs. /SQ IN.
MAY 1917.
100% 80% 60% 40%
SECTOR
I
V
IV
III
II

M A N U F A C T U R E R ' S H E A D

GAUGE PRESSURE, 50 lbs. sq. in; DEFLECTOR 6" FROM CEILING; EFFECTIVE PRESSURE, 56.5 lbs. sq. in.
5 min. runs.

PANS	S E C T O R S I	II	III	IV	V	VI	VII	VIII	Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
1	12.25	12.25	10.75	1.00	3.00	6.75	9.25	3.00	48.25				
2	1.25	14.5	10.5	2.25	7.75	6.25	6.75	6.25	49.50	A-189.00	22.7	.0715	11.07
3	0.5	8.0	8.5	4.25	.75	5.25	5.75	12.75	45.75				
4	1.0	3.5	9.75	6.75	.25	4.25	5.75	14.25	45.50				
5	3.6	24.6	24.6	3.60	4.10	16.60	15.60	9.10	101.8	B-198.3	23.8	.1378	11.60
6	2.25	10.75	25.25	10.25	1.75	11.25	11.75	23.25	96.5				
7	10.5	26.5	38.	5.50	9.25	14.75	36.75	17.00	158.25	C-309.60	37.18	.263	18.10
8	2.7	31.7	18.95	16.70	2.20	21.70	14.70	42.70	151.35				
9	28.65	67.4	39.9	15.90	34.90	16.40	16.90	27.90	247.95	D-489.20	58.7	.534	28.63
10	6.75	63.75	39.25	32.25	4.00	49.75	33.75	11.75	241.25				
11	18.5	26.5	23.75	22.00	31.00	44.25	23.00	15.50	221.0	E-221.	26.5	.338	12.93
12	5.0	6.25	7.	16.00	25.75	8.50	8.00	7.00	83.5	F- 83.5	10.01	.161	4.88
Total Pounds	82.90	295.70	256.20	136.45	118.70	205.70	187.95	190.45					87.21
Total Gallons	9.97	35.45	30.8	16.38	14.23	24.7	22.58	22.85					
QSector	5.125	5.125	5.125	5.125	5.125	5.125	5.125	5.125	41. Gals.				
% in Sector	38.8	138.2	120.2	64.	55.6	96.5	88.	89.2					

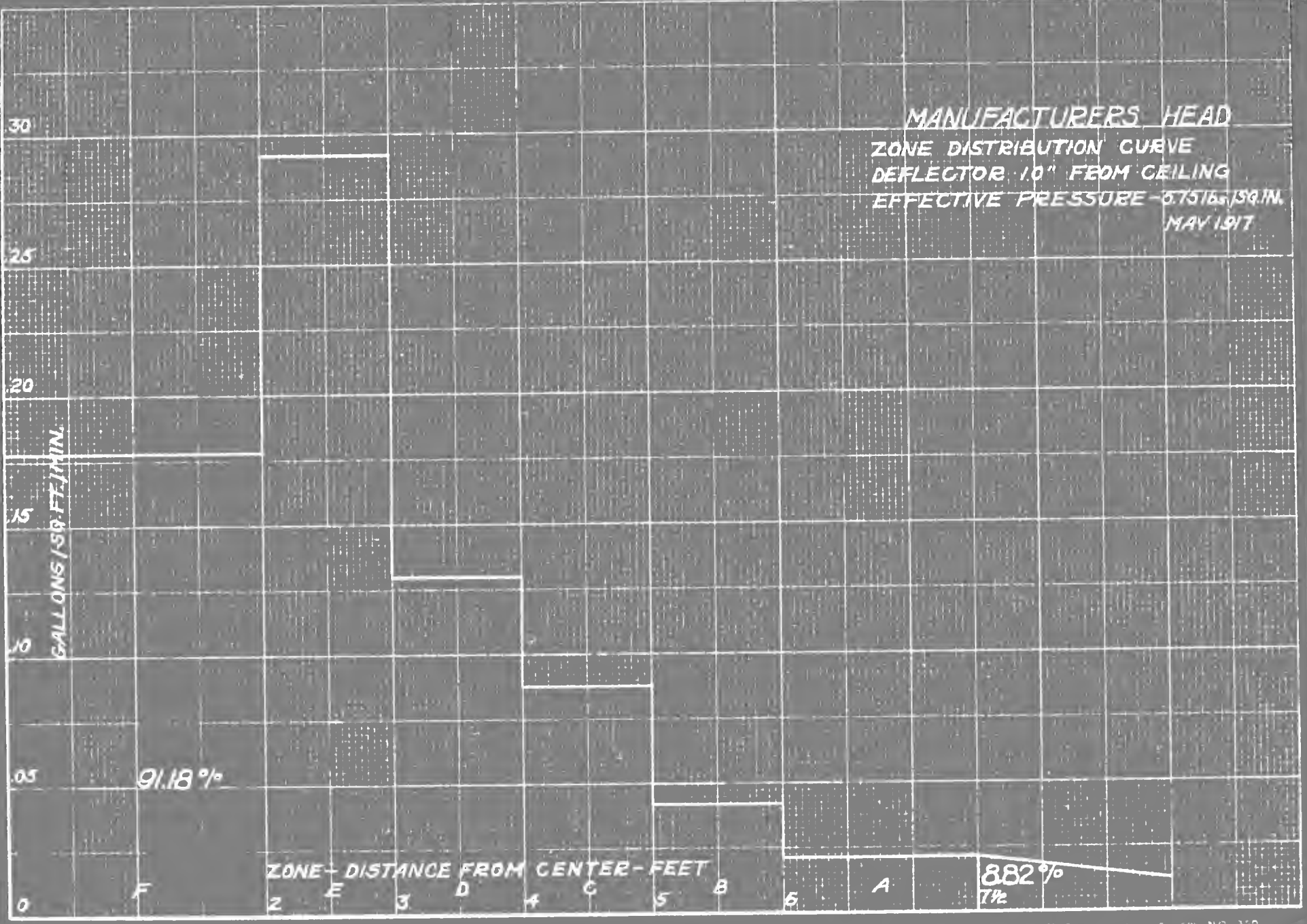

.334
MANUFACTURERS HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE - 56.5 lbs./SQ.IN.
MAY 1917
GALLONS / SQ.FT./MIN.
30
25
20
15
10
05
0
87.21%
12.79%
ZONE - DISTANCE FROM CENTER - FEET
F
2
E
3
D
4
C
5
B
6
A
7½

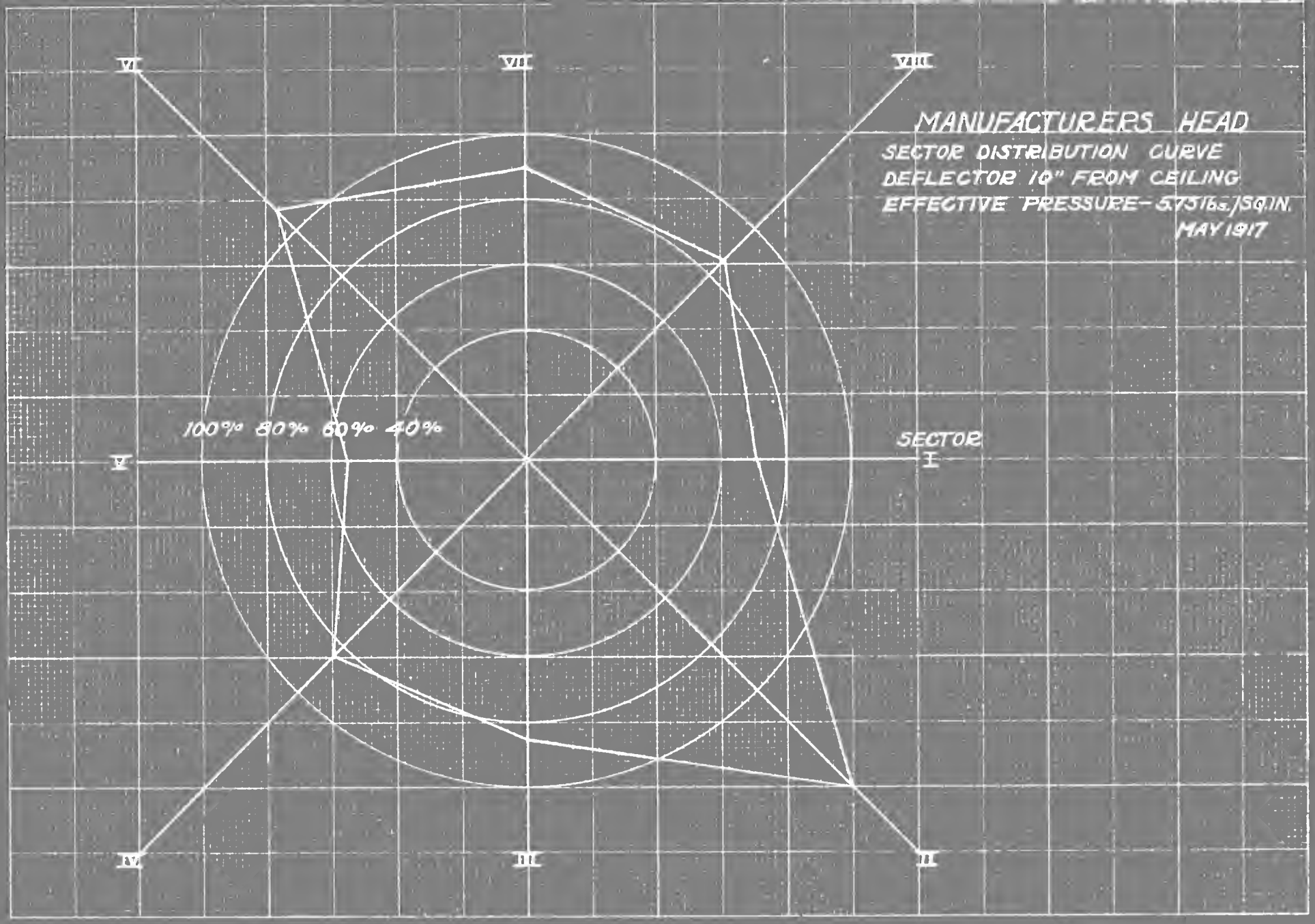

MANUFACTURERS HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 6" FROM CEILING
EFFECTIVE PRESSURE-56.5 LBS. 1/8 IN.
MAY 1917
100% 80% 60% 40%
SECTOR
I
II
III
IV
V
VI
VII
VIII

M A N U F A C T U R E R ' S H E A D

GAUGE PRESSURE, 5 lbs. sq. in; DEFLECTOR 10" FROM CEILING; EFFECTIVE PRESSURE, 5.75 lbs. sq. in.
7 min. runs.

	SECTORS								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	2.50	3.50	1.50	1.50	2.75	3.00	2.75	2.50	20.00				
2	0.75	3.50	1.25	2.50	1.00	1.50	3.25	3.50	17.25	A- 79.00	9.48	.0213	8.22
3	1.00	4.50	2.00	3.50	0.75	2.25	3.75	3.00	20.75				
4	1.25	4.00	2.75	2.75	0.75	4.00	3.25	2.25	21.00				
5	3.85	13.10	2.85	3.10	3.60	4.10	5.10	5.60	41.30	B- 89.00	10.69	.0442	9.26
6	2.25	12.25	6.75	6.75	1.25	7.25	6.75	4.75	48.00				
7	6.00	26.00	4.25	4.75	5.50	9.25	7.50	9.00	72.25	C-144.60	17.34	.0877	15.00
8	3.70	17.20	11.20	11.45	1.45	11.20	9.45	6.70	72.35				
9	8.15	16.90	6.15	5.90	6.65	18.90	6.40	12.90	81.95	D-166.45	19.99	.13	17.30
10	5.75	16.25	12.75	13.25	1.75	14.75	11.75	8.25	84.50				
11	38.50	52.50	30.00	29.25	18.75	36.75	24.00	37.25	267.00	E-267.00	32.04	.292	27.80
12	12.00	14.00	21.25	16.50	22.50	18.50	18.00	8.00	130.75	F-130.75	15.68	.178	13.60
Total Pounds	85.70	183.70	102.70	101.20	66.70	131.45	101.95	103.70					91.18
Total Gallons	10.25	22.3	12.33	12.14	8.00	15.77	12.24	12.42					
Q Sector	2.0625	2.0625	2.0625	2.0625	2.0625	2.0625	2.0625	2.0625	16.5 Gals.				
% in Sector	71.00	140.6	85.4	84.2	55.3	109.0	89.8	86.					

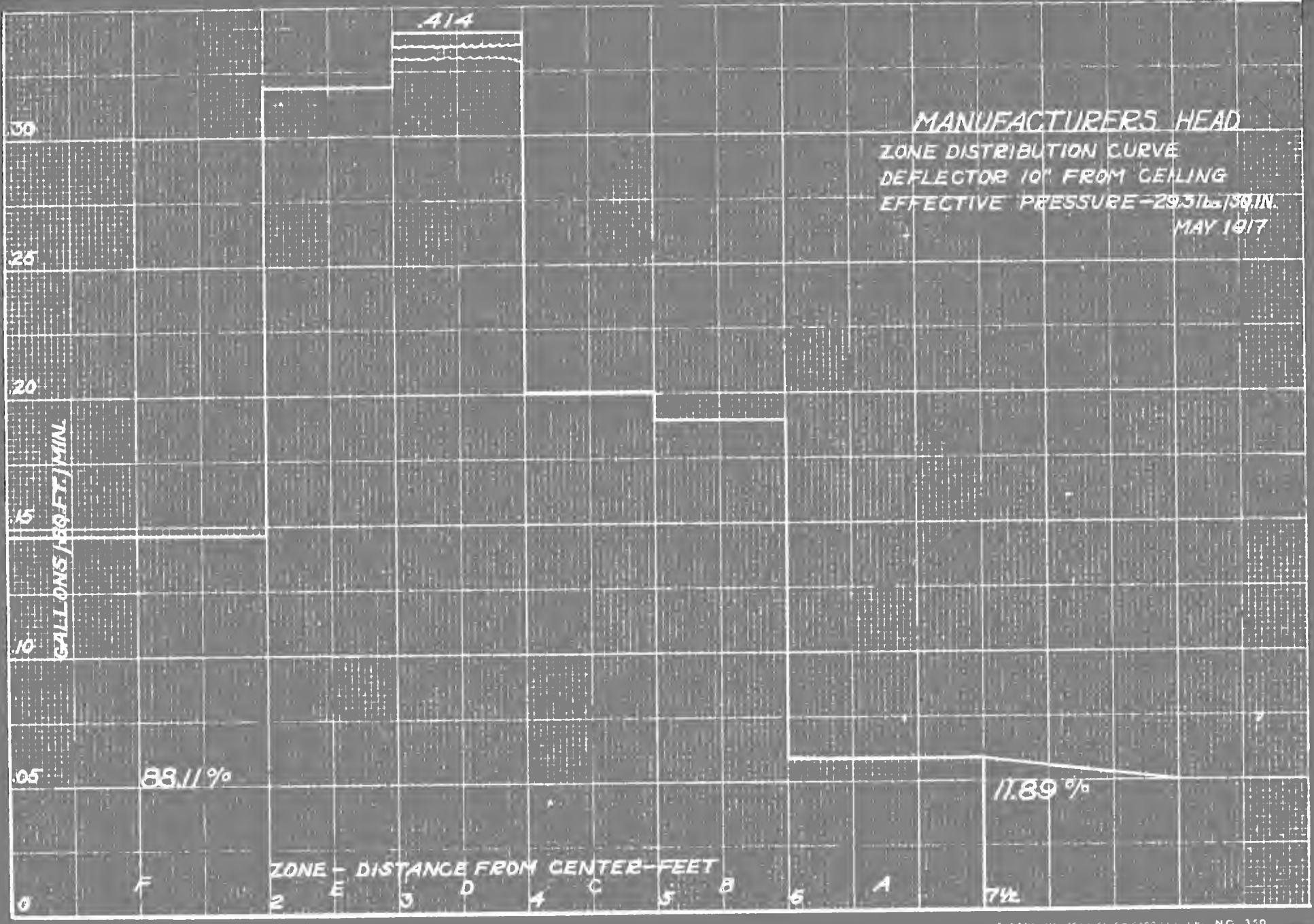

MANUFACTURERS HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 1.0" FROM CEILING
EFFECTIVE PRESSURE - 5.7516 LBS. IN.
MAY 1917
30
25
20
15
10
05
0
GALLONS PER SQ. FT. PER MIN.
91.18 %
8.82 %
1½
ZONE - DISTANCE FROM CENTER - FEET
F
2
E
3
D
4
C
5
B
6
A

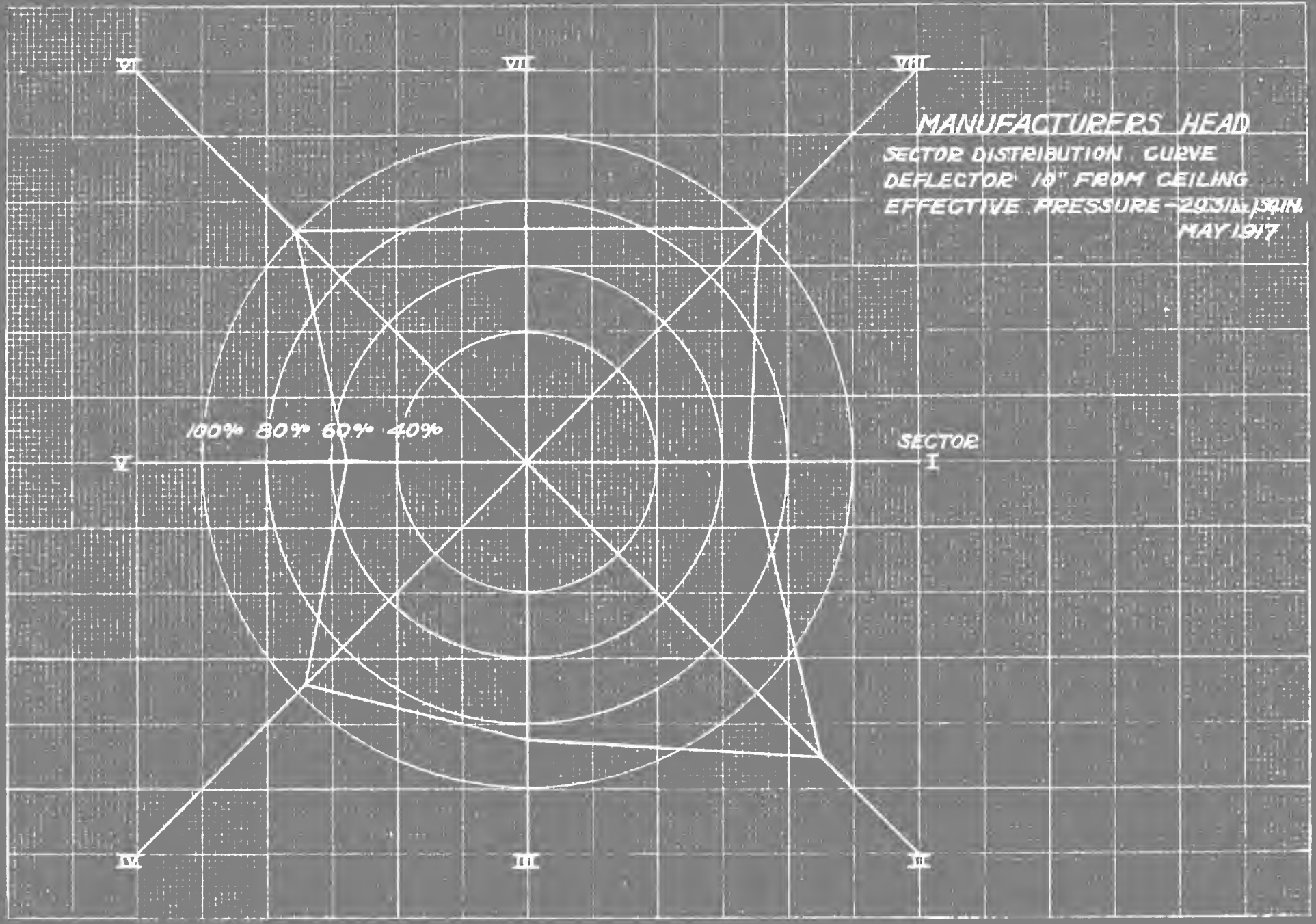

VI
VII
VIII
V
IV
III
II
100% 80% 60% 40%
SECTOR I
MANUFACTURERS HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE-5.75 lbs./SQ.IN.
MAY 1917

MANUFACTURER'S HEAD

GAUGE PRESSURE, 25 lbs. sq. in; DEFLECTOR 10" FROM CEILING; EFFECTIVE PRESSURE, 29.3 lbs. sq. in.
5 min. runs.

	SECTORS								Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
PANS	I	II	III	IV	V	VI	VII	VIII					
1	5.50	12.00	3.00	2.00	5.50	1.50	3.50	7.50	40.50				
2	2.75	14.25	1.75	4.75	2.25	1.50	3.25	13.75	44.25				
3	1.00	10.25	2.75	9.00	0.75	3.75	2.75	8.25	38.50	A-156.50	18.8	.059	11.22
4	1.75	6.75	5.75	7.00	0.50	5.75	2.00	3.75	33.25				
5	7.85	22.85	8.35	7.60	6.60	9.10	6.60	19.10	88.05				
6	5.25	14.25	10.75	19.25	1.75	11.25	7.75	13.00	82.25	B-171.30	20.55	.119	12.23
7	9.50	19.00	16.50	11.50	8.50	19.50	9.75	28.50	122.75				
8	8.70	16.45	12.20	24.70	2.70	14.70	12.70	18.70	113.85	C-236.60	28.4	.201	16.95
9	26.90	30.90	29.15	15.15	25.90	16.40	23.40	19.40	187.20				
10	21.25	47.75	15.75	28.75	3.75	42.00	12.75	20.50	192.00	D-379.20	45.5	.414	27.20
11	23.00	22.50	34.00	20.75	23.00	40.50	31.75	13.75	209.25	E-209.25	25.08	.319	15.00
12	6.50	5.00	7.25	17.50	15.75	8.75	8.75	7.50	77.00	F- 77.00	9.24	.147	5.51
													88.11
Total Pounds	119.95	221.95	147.20	167.95	96.95	174.70	124.95	173.70					
Total Gallons	14.4	26.65	17.65	20.18	11.64	20.95	15.00	20.85					
QSector	4.1875	4.1875	4.1875	4.1875	4.1875	4.1875	4.1875	4.1875	33.5 Gals.				
% in Sector	69.	127.5	84.5	96.5	55.75	100.00	71.8	99.8					


.414
30
25
20
15
10
05
0
GALLONS/100 FT²/MIN.
88.11%
11.89%
ZONE - DISTANCE FROM CENTER - FEET
F
2
E
3
D
4
C
5
B
6
A
7½
MANUFACTURERS HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE - 29.3 lb. / 30 IN.
MAY 1917



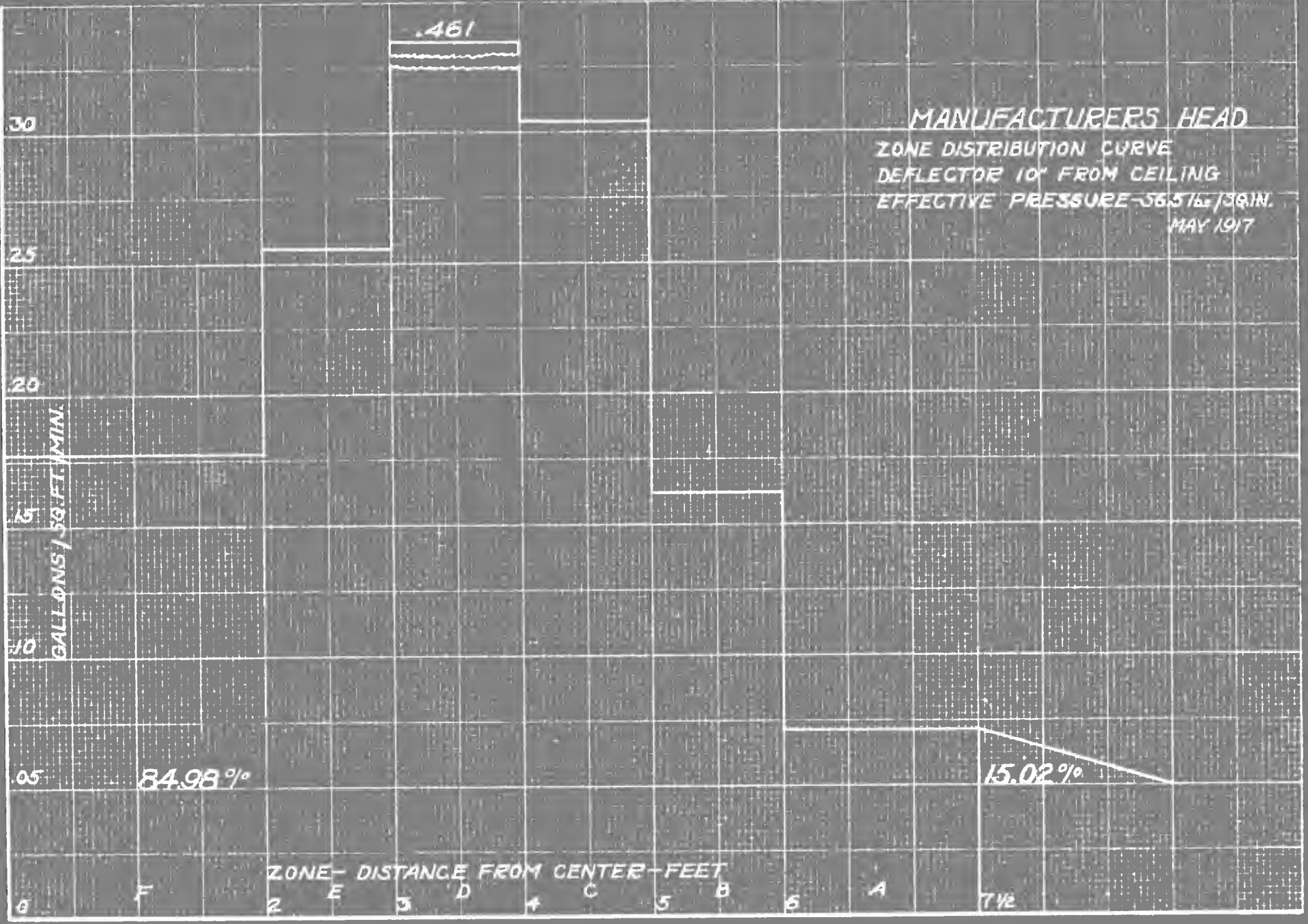
MANUFACTURERS HEAD

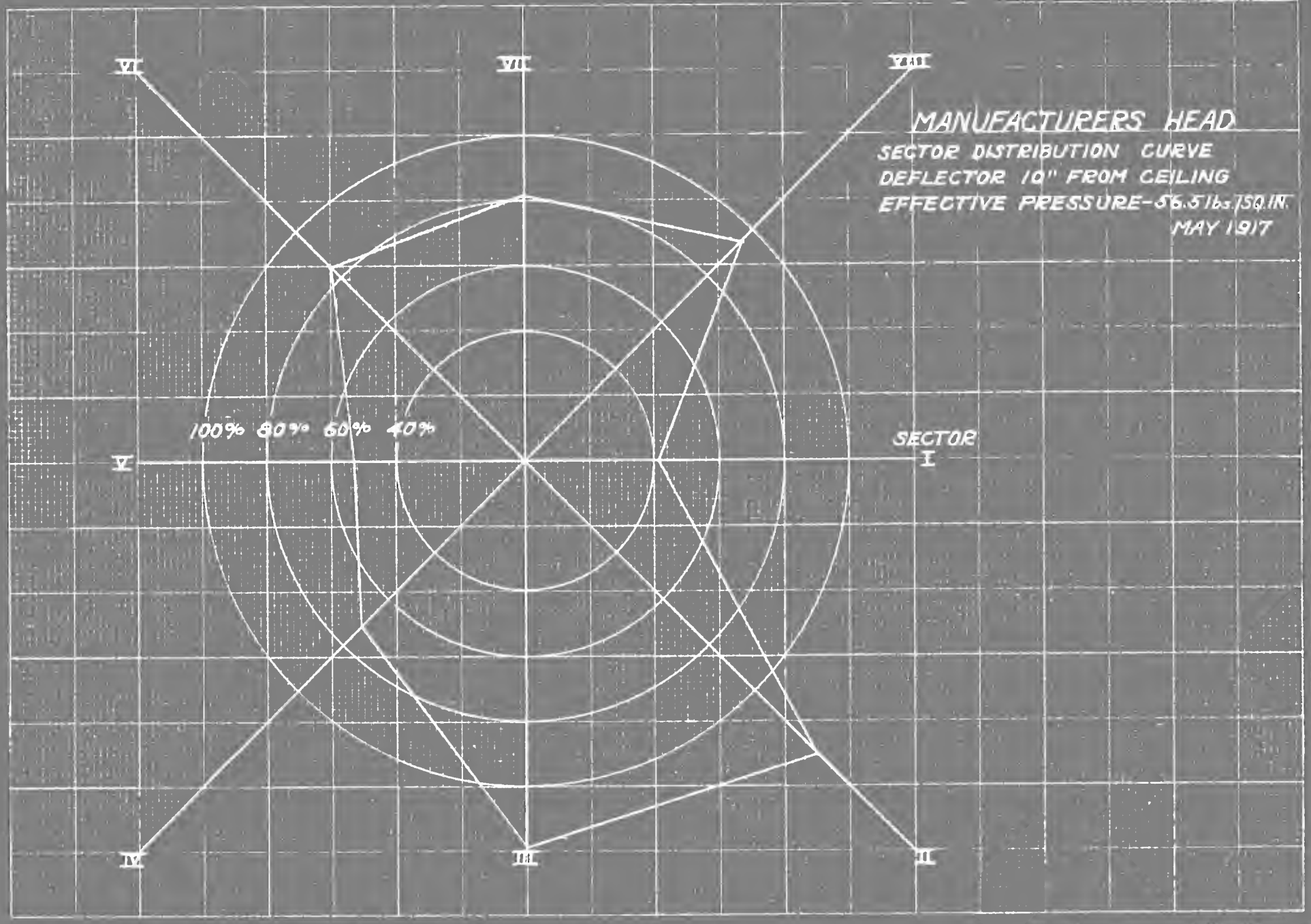
SECTOR DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE - 2.93 LBS. PER SQ. IN.
MAY 1917

M A N U F A C T U R E R ' S H E A D

GAUGE PRESSURE, 50 lbs. sq. in; DEFLECTOR 10" FROM CEILING; EFFECTIVE PRESSURE, 56.5 lbs. sq. in.
5 min. runs.

PANS	SECTORS I	II	III	IV	V	VI	VII	VIII	Total Weight	Weight in Zone	Gals. In Zone	Gals. Sq.Ft.Min.	% in Zone
1	3.25	12.75	9.75	1.50	5.40	4.00	8.55	5.50	50.70				
2	1.75	15.25	9.50	3.00	2.70	3.75	6.05	10.25	52.25	A-189.24	22.7	.0715	11.07
3	.75	8.25	8.25	5.00	0.62	4.00	4.80	7.75	39.42				
4	1.00	4.25	9.00	7.75	0.21	5.25	4.16	15.25	46.87				
5	4.35	25.10	28.10	4.85	6.54	16.35	15.90	15.10	116.29	B-223.62	28.0	.162	13.65
6	2.25	10.75	26.25	13.75	1.88	11.25	11.45	29.75	107.33				
7	11.50	31.00	41.00	8.50	14.55	17.50	37.05	26.50	187.6	C-346.45	41.6	.304	20.30
8	3.45	36.20	22.70	28.20	3.05	18.45	14.10	32.70	158.85				
9	22.90	58.40	34.90	20.90	32.50	15.65	13.65	23.90	222.8	D-422.7	50.7	.461	24.70
10	8.25	48.75	35.75	22.00	6.85	37.75	29.80	10.75	199.9				
11	21.50	13.50	18.75	17.50	20.00	38.00	22.70	16.00	167.95	E-167.95	20.16	.256	9.84
12	7.75	8.50	10.25	21.25	19.55	8.50	9.15	8.50	93.45	F- 93.45	11.1	.177	5.42
Total Pounds	88.70	272.70	254.20	154.20	113.85	180.45	177.36	201.95					84.98
Total Gallons	10.65	32.78	30.5	18.5	13.65	21.65	20.68	24.2					
QSector	5.125	5.125	5.125	5.125	5.125	5.125	5.125	5.125	41. Gals.				
% in Sector	41.5	127.8	119.	72.3	53.3	84.8	81.	94.5					


.461
MANUFACTURERS HEAD
ZONE DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE-56.5 lbs./30 IN.
MAY 1917
30
25
20
15
10
05
GALLONS / SQ.FT./MIN.
84.98 %
15.02 %
ZONE- DISTANCE FROM CENTER-FEET
0
F
2
E
3
D
4
C
5
B
6
A
7½


MANUFACTURERS HEAD
SECTOR DISTRIBUTION CURVE
DEFLECTOR 10" FROM CEILING
EFFECTIVE PRESSURE-56.5 lbs./SQ.IN.
MAY 1917
VI
VII
VIII
V
SECTOR I
IV
III
II
100%
80%
60%
40%